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INSTRUCTION MANUAL
Model 6400

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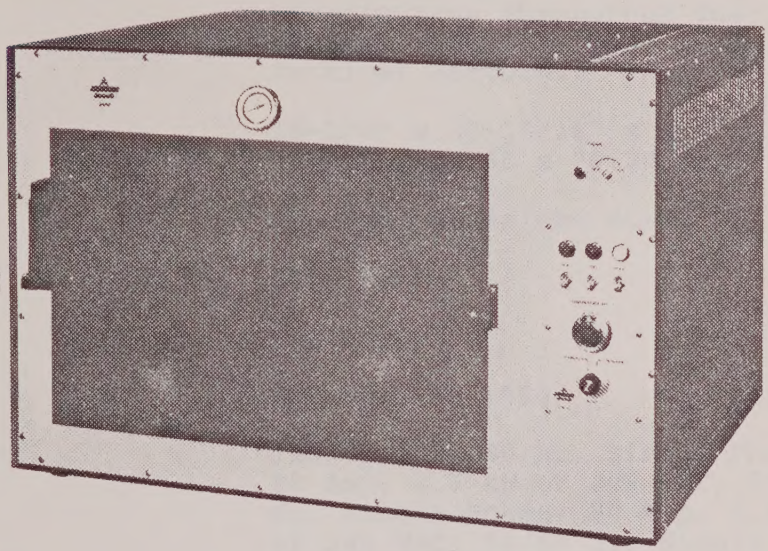


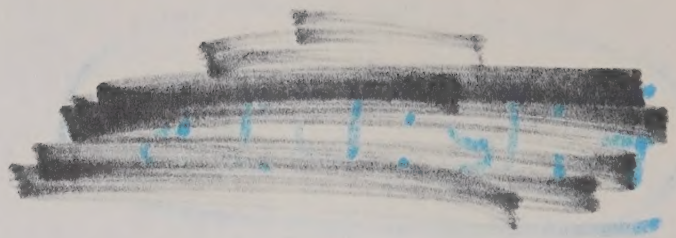
DELTA DESIGN INC.

ENVIRONMENTAL TEST CHAMBER

ENVIRONMENTAL CONTROL EQUIPMENT FOR RESEARCH AND INDUSTRY
5725 KEARNY VILLA ROAD • SAN DIEGO, CALIFORNIA 92123

6400-0976

Printed in U.S.A.



SPECIFICATIONS

TEST VOLUME (H x W x D)	12" x 20" x 16" (30.48 x 50.80 x 40.64 Cm) 2.2 FT^3 (.062 M^3)
AIR CIRCULATION	Two 140 CFM Centrifugal Blowers With Baffling To Provide Equal Distribution Throughout The Chamber. The Air Flow Is In A Vertical Pattern.
OUTSIDE CASE DIMENSIONS	19-1/8" x 32-15/16" x 30" (48.56 x 83.66 x 76.20 Cm)
INNER LINER	Type 302 Stainless Steel
OUTER CASE	Aluminum
INSULATION	Fiberglas
WEIGHT	140 Lbs (63.50Kg)
POWER REQUIREMENTS	120 VAC, 50/60 Hz, Single Phase, 20 Amp, 2.4 kW or 208 VAC, 50/60 Hz, Single Phase, 20 Amp, 2.4 kW or 240 VAC, 50/60 Hz, Single Phase, 15 Amp, 2.4 kW.
CONTROLS	POWER On-Off Switch and Light COOL On-Off Switch and Light HEAT On-Off Switch and Light TEMPERATURE SET Control MANUAL/PROGRAM Control Switch (MODE)
HEATING ELEMENTS	Four 8.75 Ohm Elements, Nichrome Wire, Total of 1 kW for 120V and 1.6 kW for 240V. For 208V, Four 15 Ohm Elements, Nichrome Wire, Total of 3 kW.
COOLING	Liquid Carbon Dioxide (LCO_2) or Liquid Nitrogen (LN_2)
PROGRAMMING	Programmable
COOL DOWN TIME	Ambient to -54°C in 4½ minutes
HEAT UP TIME	Ambient to +217°C in 28 minutes
TEMPERATURE RANGE	-73°C to +315°C
RESETTABILITY	$\pm$0.25°C

TEMPERATURE DEVIATION	±0.05°C
LINE VOLTAGE STABILIZATION	±0.15°C For 105 to 125 VAC Line Voltage Change ±0.15°C For 200 to 215 VAC Line Voltage Change ±0.15°C For 220 to 240 VAC Line Voltage Change
AMBIENT TEMPERATURE COMPENSATION	±0.010°C/°C
HEAT LOAD COMPENSATION	.020°C/Watt For Operation Above Ambient. .013°C/Watt For Operation Below Ambient.
GRADIENT IN TEST AREA (1-1/2" from walls in corners and in the center of the test area)	±0.75°C/100°C Difference Measured From Ambient
THERMAL IMPEDANCE OF CHAMBER	Approximately 0.40°C/Watt
NULL DETECTOR CONTACT CLOSURE	Temperature Will Be Within 2°C Of Final Temperature At 3 Minutes After Closure Occurs
NULL DETECTOR CONTACT RATING	1 Amp, 240 VAC, With Contact Protection Provided By User To Protect Against Inductive Loads

NOTE: IT IS RECOMMENDED THAT THIS MANUAL BE READ THOROUGHLY BEFORE CONNECTING EQUIPMENT TO ELECTRICAL POWER SOURCE.

INTRODUCTION

This Delta Design, Inc., Model 6400 Chamber is a precision environmental test chamber capable of attaining temperatures from -73°C to +315°C with a minimal temperature deviation of ±0.05°C.

Temperature control in this chamber is by means of Delta's Solid State Controller, which can be operated manually or thru an external programmer.

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P/L 2636342	Chamber Assembly 6400	

1 CHAMBER AND CONTROLLER DESCRIPTION

1.1 Chamber

1.1.1 The Model 6400 is a precision environmental temperature chamber having a stainless steel interior, aluminum outer case and fiberglas insulation. The air circulation is closed and provided by 140 CFM blowers. The chamber is heated by applying full wave power to bobbin wound nichrome heating elements via the heat switch.

1.1.2 The chamber is cooled by injecting liquid CO_2 (liquid nitrogen in the LN_2 models) into the air stream through an expansion nozzle. The coolant flow is metered by a solenoid valve, controlled by the cool solid state switch.

1.1.3 The temperature control system is shown in block diagram form as Figure 8.

1.2 Solid State Controller

1.2.1 The controller compares the resistance of the temperature probe to the resistance of the indicated set point on the TEMPERATURE SET dial potentiometer or the digital resistance selection of the optional DIGITEMP controller. The resistance of a remote programming resistor is compared to the probe resistance of the MODE switch in the PROGRAM position.

1.2.2 The resistance of the probe will be either less than, equal to, or greater than the resistance of the TEMPERATURE SET potentiometer (or the DIGITEMP), i.e., program resistance. These three situations directly correspond to the chamber temperature being lower than, equal to, or higher than desired. The controller applies heat, coolant, or withholds both to obtain and maintain the selected temperature in the chamber.

1.2.3 NOTICE: The controller is a three mode unit, i.e.:

(a) Heat only
(b) No heat or coolant
(c) Coolant only

This mode of control ensures that LCO_2 or LN_2 is not wasted in a continuous cycling of the heaters and coolant valve such as would be the case for a simple two mode output controller.

1.2.4 Further information on the controller may be found in the complete Type III Controller Manual included as part of this information package.

1.3 Null Detector Circuit

1.3.1 A contact closure is provided at the rear which functions when the chamber reaches the indicated set point of the controller.

This contact closure may be used to signal external equipment that the chamber has reached selected temperature.

1.3.2 The Delta Design Model 9308 HI-LO Step Programmer, Model 9311 TEN STEP Programmer, and the Model 9313 HI-LO AMBIENT Programmer utilize the null contacts to start their timers when they are used with the chamber. This contact closure feature is most useful in automatic test programming applications.

2 INITIAL SETUP

2.1 Uncrating - Remove all shipping tie downs and protective packaging.

2.2 Electrical Connection - Depending on the chamber purchased, one of the following is applicable. Power connection should be an AC power source rated at 120 VAC, 50/60 Hz, single phase, 20 Amp or 208 VAC, 50/60 Hz, single phase, 20 Amp or 240 VAC, 50/60 Hz, single phase, 15 Amps. THE CHAMBER MUST BE CONNECTED TO EARTH GROUND.

2.2.1 Delta chambers that operate on 240 VAC split the incoming phases for the coolant valve solenoid, failsafe relay, blowers and for the controller. The heater circuit operates on 240 VAC.

2.3 Liquid Coolant - Liquid Carbon Dioxide (LCO_2) - 1050 psi system (standard). Optional systems are LCO_2 - 300 psi, and Liquid Nitrogen (LN_2) - 100 psi.

2.3.1 Liquid Carbon Dioxide - 1050 psi system. A siphon type liquid CO_2 bottle is recommended.

2.3.1.1 Test the bottle by releasing a small amount of LCO_2 into a white handkerchief. Any brown stain indicates rust which would clog the filter and valve in the chamber. A wet handkerchief indicates the presence of water which would either freeze in the valve or clog the injector nozzle. Crack the LCO_2 valve on the cylinder open and notice the spray. It should be a dense, white cloud. It will look thin and grey when the tank is almost empty. An almost empty tank will not give proper cooling and should not be used. Connect the tank of LCO_2 to the rear of the chamber with the high-pressure hose and fittings which are supplied. Place a small amount of sealing compound on the threads of the male fitting to prevent leakage. DO NOT LET ANY SEALING COMPOUND GET INTO THE VALVE INLET ON THE REAR OF THE CHAMBER. Open the bottle and check for leaks which show as frosty spots on the hose and fittings.

2.3.2 Liquid Carbon Dioxide - 300 psi Low Pressure system.

2.3.2.1 When the in-plant use of liquid CO_2 exceeds approximately 1000 to 2000 pounds per month, a bulk liquid storage system may be installed to reduce the cost of coolant. Chambers being operated with this type of system have to be fitted with a different CO_2 valve and injector than used on a 1050 psi system. Contact Delta for information concerning valve replacement. If new chambers are ordered for use with a bulk storage 300 psi system, the fact should be stated on the order.

NOTE: The bulk storage system should be of the recirculating type, if possible. If not, the supply should be located as close as possible to the chamber to minimuze gas formation in the supply line. This is

particularly important in low volume usage systems as the insulation and fluid flow are the factors that prevent boiling of CO_2 in the supply line. Gaseous CO_2 is not an effective coolant.

2.3.2.2 All lines, valves and connecting hoses should be blown out before the chamber is connected. Water is very troublesome and is apparently inherent in some low-pressure refrigerated supplies. If lines are opened to bleed off excessive pressure at shutdown, close them to prevent contamination by condensed moisture. This will help keep ice from forming in the control valve.

2.4 Liquid Nitrogen

WARNING

Oxygen in the air surrounding the chamber inner liner and in the insulation can be liquified at low temperatures. This creates an oxygen-rich atmosphere surrounding the heater area. The chamber tends to be self-purging as the nitrogen replaces the usual atmosphere near the heaters. Any mixture of oil and liquid oxygen can be explosive; therefore, extreme care must be used during operation at very low temperatures.

2.4.1 A 100 psi valve and stainless steel injector assembly is used for the liquid nitrogen applications. LCO_2 from a tank will not operate properly in a chamber equipped for LN_2.

2.4.2 Connect a liquid nitrogen withdrawal container to the LN_2 input of the chamber with an insulated transfer line. A relief valve should be installed in the line with a relief pressure between 60 and 100 psi for a 2700 cubic foot 50 psi liquid withdrawal container.

3 STARTING UP PROCEDURE

3.1 Precautions

3.1.1 Connect SAFETY PLUG (rear of chamber) when external programmer is not being used. This will preclude any accidental high temperature being obtained if the MODE switch is placed in the PROGRAM position with no programmer connected.

3.1.2 Unplug the chamber from all sources of power before attempting any type of servicing or removal of the controller chassis. The case of the triac switch assembly, located on the controller subassembly, is at power line potential and extreme care in servicing or calibration must be exercised.

3.1.3 Do not block the sides of chamber or outlet of controller area for cooling purposes.

3.1.4 Ensure that the correct type of LCO_2 (liquid carbon dioxide) source is connected to the chamber before operating at low temperature. Recommend standard 50 pound capacity high dry siphon LCO_2 supply. Test the LCO_2 for cleanliness by discharging a quantity of it through a clean white handkerchief. Bits of rust and traces of oil, ice or water indicate contaminated LCO_2 which should not be used.

3.1.5 Operate the chamber at a temperature of 200°C for an hour after prolonged operation at low temperatures. This restores the efficiency of the insulating material by driving out the moisture which has been condensed out of the air.

WARNING

Liquid oxygen may be formed in the insulation when the chamber is operated at low temperatures. Any mixture of oil and liquid oxygen can be explosive. If oil contamination is suspected, bake the chamber out by operating it at a temperature of 200°C for a period of three hours before taking it to extremely low temperatures.

3.1.6 Do not leave liquid nitrogen trapped in a line (valves closed at both ends) as high pressures will be developed as the liquid absorbs heat and becomes gas.

3.2 Controls - See Figure 2.

3.3 Adjusting the Failsafe

3.3.1 To adjust the FAILSAFE high temperature protection unit, rotate the slotted FAILSAFE control. The trip temperature is increased by rotating the control counterclockwise, and is lowered by turning the control clockwise. The FAILSAFE setting is preset at the factory at +315°C (maximum rating of standard chamber). If it is desirable to change the setting to a lower temperature setting, operate the chamber at the maximum temperature desired. Adjust the FAILSAFE until it is on the verge of tripping.

CAUTION

Do not rotate the FAILSAFE setting more than one full turn lower than the trip point, as this can damage the unit.

4 SETTING THE DIAL TEMPERATURE INDICATOR

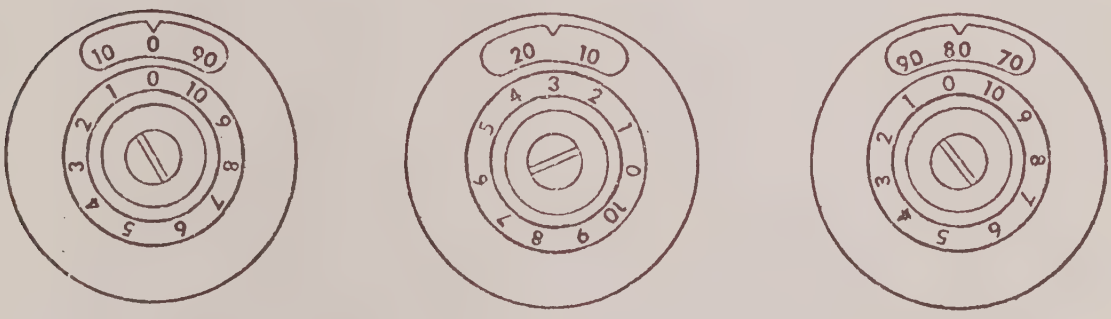
4.1 Description

4.1.1 Refer to example A - Set both dials at zero.

4.1.2 One complete rotation of the knob equals 100°. Clockwise is plus (+) degrees (F or C) and counterclockwise is minus (-) degrees. Each rotation of the knob is indicated by the small dial nearest the knob.

4.1.3 The large dial indicates each degree, every tenth numbered. Thus, as in example B, the large dial is set at 15, and the small dial is beyond 3; therefore, the setting is +315°.

4.1.4 When setting to a minus (-) temperature, it is necessary to subtract the degrees from 100; i.e., 20 from 100 equals "80" reading on the large dial to have a setting of -20°. This is shown in example C. It will be noted that the zero on the small dial is just to the left of the marker. Also, on the models having a range greater than -100°, it is necessary to keep track of the counterclockwise rotation of the knob.



A (0°) B (+315°) C (-20°)

FIGURE 1
Temperature Set Dial

5 PROGRAMMING

5.1 Description

5.1.1 Connect the correct resistances between pins 1 and 3 of the PROGRAM Jack. Set the MODE switch to PROGRAM and the HEAT and COOL switches to their ON positions. The controller will apply heat or coolant as needed to obtain the programmed temperature.

5.1.2 A Safety plug is provided with the chamber and should be kept connected to the PROGRAM input whenever an actual programmer or actual resistance is not connected. The safety plug will prevent the chamber from accidently being programmed to a very high temperature if the MODE siwtch is placed in the PROGRAM position with an open PROGRAM input.

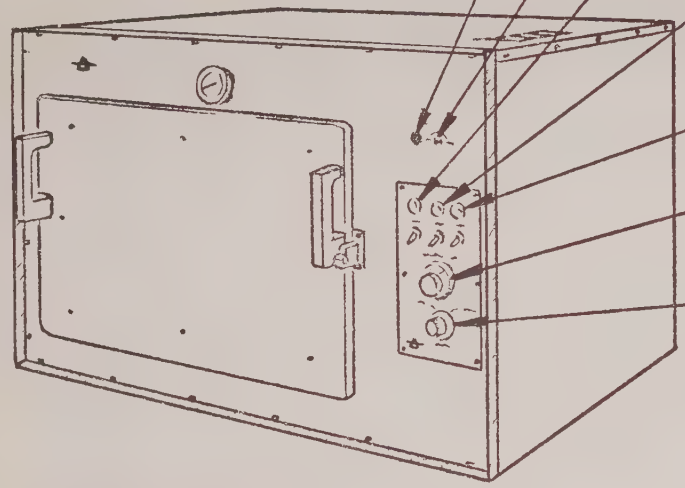
5.1.3 The safety plug disables the heat and cool circuits of the controller when the MODE siwtch is placed in the PROGRAM position.

6 WARRANTY

Delta Design, Inc. guarantees all products manufactured and sold by it to conform to published specifications and against defective material and workmanship for a period of 90 days from the date of our shipment. Temperature chambers and electronics are warranted for one year from date of shipment. All contactor assemblies are warranted for a period of 90 days or 1/2 million cycles. Obligation under these warranties is limited to repair or replacement by Delta at its plant or one of its authorized service stations, on any of our products which Delta determines to be defective or not in accord with stated specifications. Delta will not accept responsibility for any defect caused by improper use, nor will Delta assume liability for any unauthorized repairs or modifications to its products or materials, even though defective or not in accord with the specifications. In no case will responsibility extend to products, materials, or equipment not manufactured by Delta. All products to be returned to Delta's plant for warranty repair must have prior written approval from Delta Design, Inc., and all return transportation charges will be at the buyer's expense. Delta will not accept liability for any unauthorized returns. No liability will be accepted for any damages to customer's materials, and equipment due to the use or misuse of Delta's products, nor for any loss of profits or other special damages. Delat Design, Inc., reserves the right to change price, design features and/or specifications without notice.

FAILSAFE ADJUST- LOCATED ON FRONT OF CHAMBER
TURN TO CHANGE TEMPERATURE AT WHICH FAILSAFE WILL TRIP
CAUTION: DO NOT LOWER FAILSAFE TEMP. SETTING UNLESS HEAT SW. IS ON & FAILSAFE IS OFF.

FAILSAFE LAMP- GLOWS RED WHEN FAILSAFE IS TRIPPED



THERMOMETER- INDICATES CHAMBER TEMP. IN TEST VOLUME.

OPERATING INSTRUCTIONS:

A. INSTALL THE CHAMBER, CONNECT POWER CORD TO SUITABLE OUTLET & COOLANT SUPPLY TO VALVE INLET.

B. FOLLOW STEPS 1 THRU 5.

(5) HEAT SWITCH & LIGHT-- SWITCH ON--ON POSITION ALLOWS CONTROLLER TO APPLY HEAT AUTOMATICALLY TO MAINTAIN SELECTED TEMPERATURE IN CHAMBER RED LIGHT IS ON STEADY WHEN CHAMBER IS HEATING, BLINKS WHEN CHAMBER REACHES SELECTED TEMPERATURE ABOVE AMBIENT

(4) COOL SWITCH & LIGHT--SWITCH ON-- ON POSITION ALLOWS CONTROLLER TO APPLY COOLANT AUTOMATICALLY TO MAINTAIN SELECTED TEMPERATURE IN CHAMBER GREEN LIGHT IS ON STEADY WHEN CHAMBER IS COOLING.

(3) POWER SWITCH & LIGHT--SWITCH ON MAIN POWER ON. WHITE LIGHT GLOWS WHEN POWER IS ON.

(2) TEMPERATURE SET DIAL--SET TO DESIRED TEMPERATURE. SELECTS CHAMBER TEMPERATURE IF MODE SWITCH IS IN MANUAL POSITION.

(1) MODE SWITCH-- SET TO MANUAL POSITION. ASSIGNS THE SELECTION OF CHAMBER TEMPERATURE TO TEMPERATURE SET DIAL OR EXTERNAL PROGRAMMER.

MANUAL POSITION: TEMPERATURE SET DIAL DETERMINES CHAMBER TEMPERATURE.

PROGRAM POSITION: PROGRAMMING RESISTANCE CONNECTED TO PROGRAM JACK AT REAR OF UNIT SELECTS CHAMBER TEMPERATURE

CAUTION: ALWAYS CONNECT SAFETY PLUG (AT REAR OF CHAMBER) WHEN AN EXTERNAL PROGRAMMER IS NOT BEING USED

FIGURE 2
OPERATING INSTRUCTIONS

TROUBLE SHOOTING: ELECTRICAL

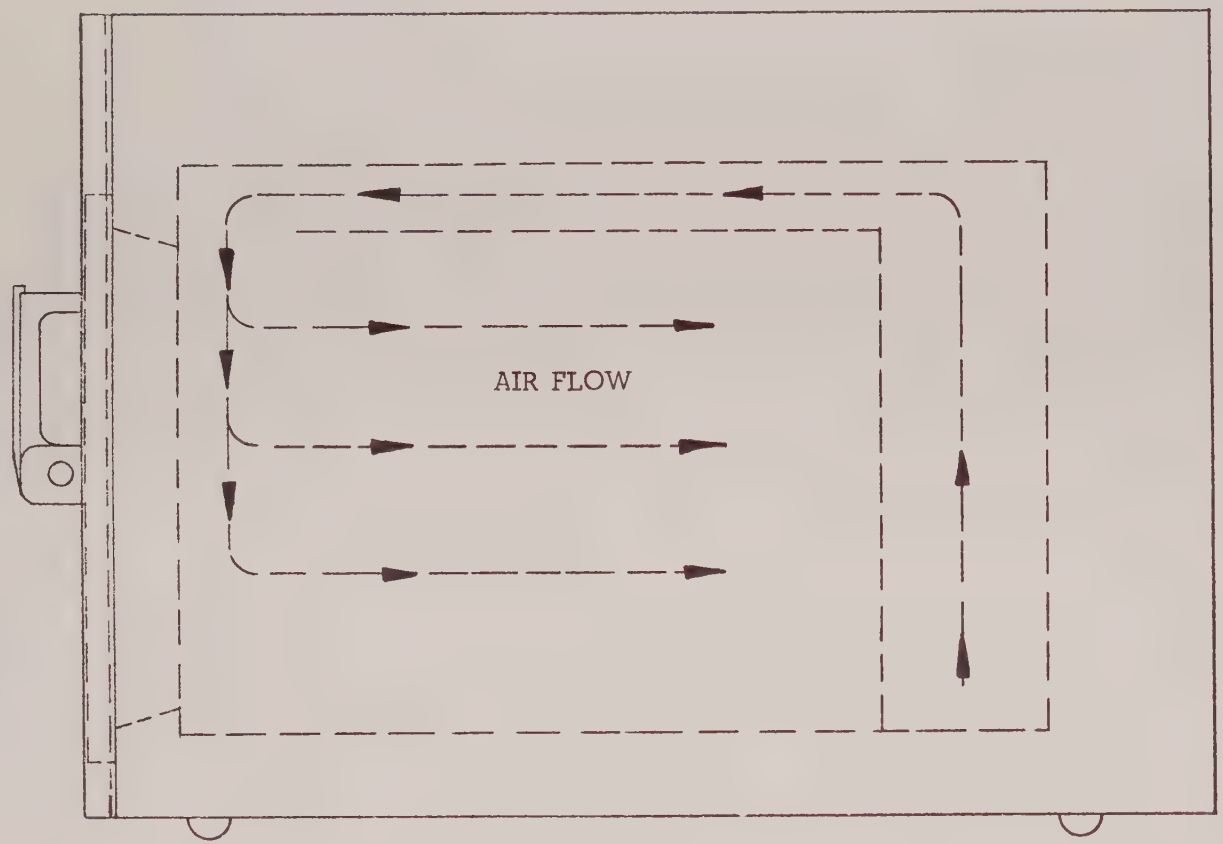
HOW TO USE THIS CHART

1. Turn Mode Switch to Manual.
2. Note Thermometer Reading (Chamber Temperature)
3. Turn Heat and Cool Switches On.
4. Turn Temperature Set Control 50° Higher than Chamber Temperature and note the conditions of the Heat and Cool Lamps.
5. Turn Temperature Set Control 50° Lower than Chamber Temperature and note the conditions of the Heat and Cool Lamps.

These two situations determine the correct block to read in the chart:

6. Enter the Chart at the Top for the conditions observed in step 4. (50° Higher than Chamber Temperature.)
7. Enter the Chart at the Left Side for the conditions observed in step 5. (50° Lower than Chamber Temperature.)

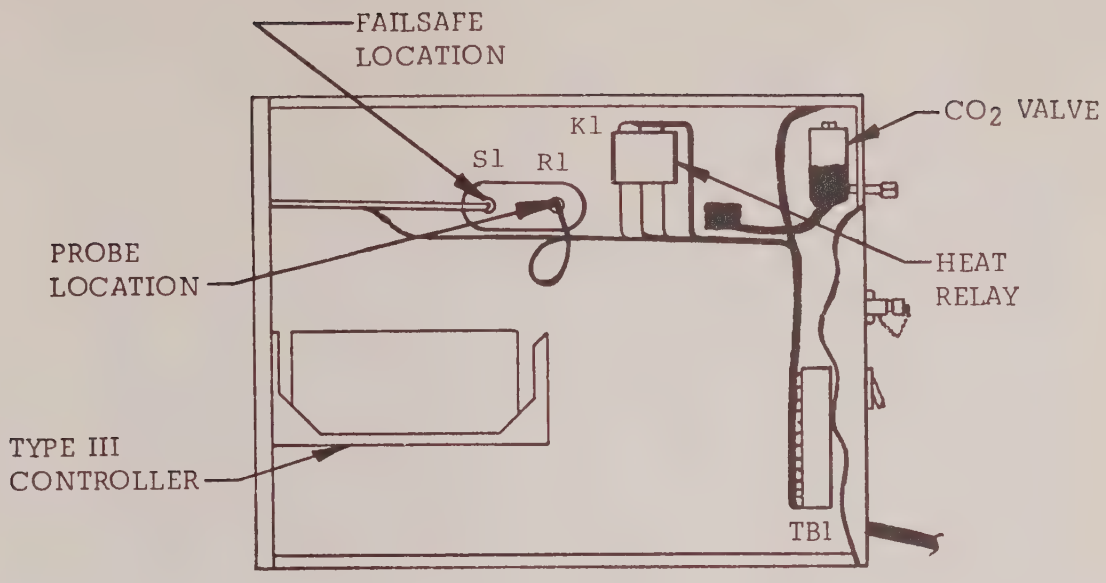
	LIGHT STATE WITH TEMPERATURE SET DIAL 50° HIGHER THAN CHAMBER TEMP.				
LIGHT STATE WITH TEMPERATURE SET DIAL 50° LOWER THAN CHAMBER TEMP.		RED - OFF GREEN - OFF	RED - ON GREEN - OFF	RED - OFF GREEN - ON	RED - ON GREEN - ON
	RED - OFF GREEN - OFF	Probe Element shorted to case. (Replace) Failure on Amplifier P.C. Board. (Trace signal with scope) Transformer Winding open.	Cool Circuit has failed. Trace signals with scope.		
	RED - ON GREEN - OFF		Probe shorted out. Temp. set Pot. — open. Cool Anticipator winding open. Check between Terminal A and Case of Q8 for 10Ω.		
	RED - OFF GREEN - ON	Failsafe Relay K1 not energizing. Coil resistance will be Approx. 10K. Failsafe open. Heat Triac failed.	NORMAL	Probe Open. Temp. Set. Pot. shorted. Heat Anticipator Winding open: Check between B and Case of Q9 for 10Ω.	Cool Circuit has failed — Trace signal with scope.
	RED - ON GREEN - ON		Heat circuit has failed — Trace signal with scope. Triac failed.		



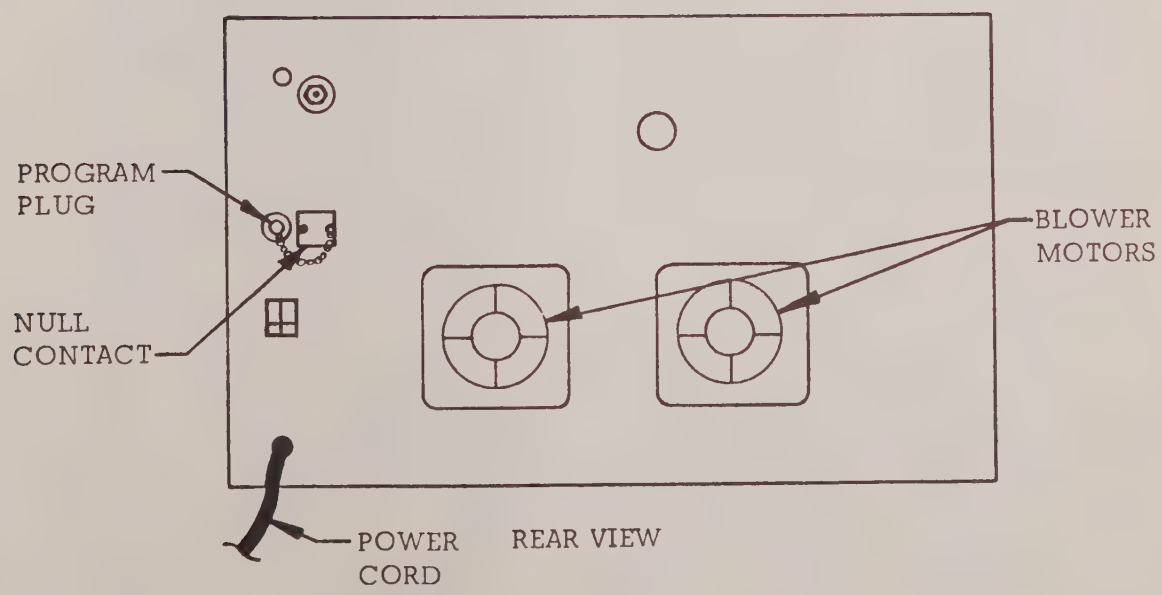
SIDE VIEW

FIGURE 3

CHAMBER AIR FLOW PATTERN



SIDE VIEW



REAR VIEW

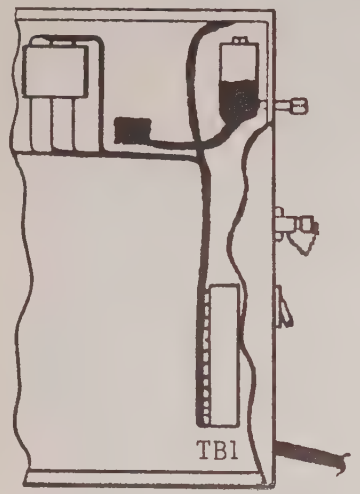
FIGURE 4
COMPONENT IDENTIFICATION

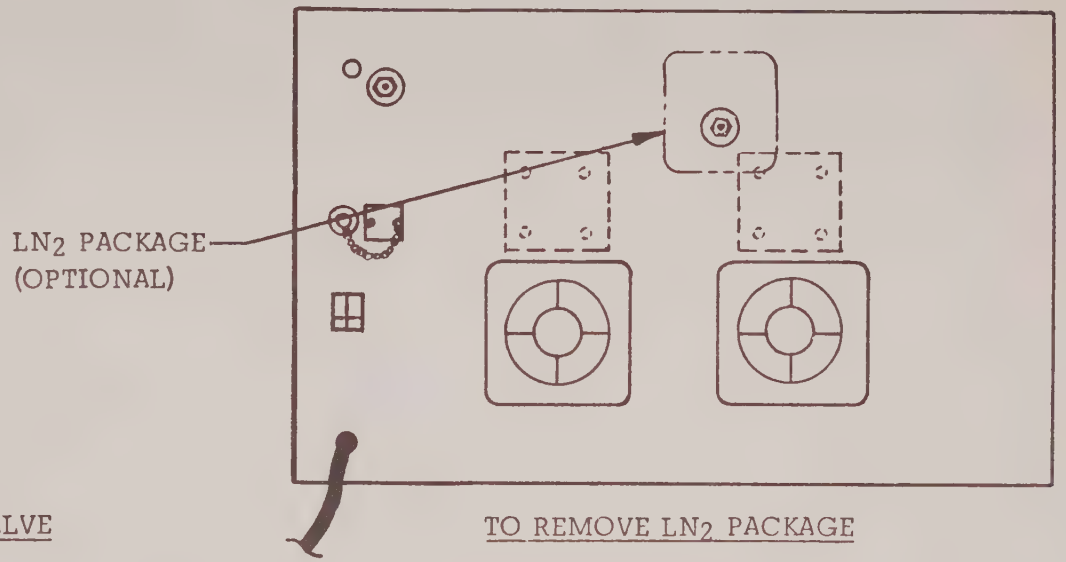
TO REMOVE BLOWER MOTORS

1. Unplug chamber power cord.
2. Do not remove rear panel.
3. Remove 4 screws and lay grill aside.
4. Remove wire nuts connecting motor to chamber power.
5. Remove two screws that mount motor to chamber.
6. Pull motor straight back to remove.

TO REMOVE HEATER

1. Unplug chamber power cord.
2. Remove and lay rear panel horizontally behind chamber.
3. Unpack fiberglas to expose heaters.
4. Remove wires from each heater unit.
5. Remove mounting screws.
6. Pull out heater assembly.





TO REMOVE CO_2 VALVE

1. Unplug chamber power cord.
2. Remove screws from right side cover.
3. Place right side cover on top of chamber.
4. Unscrew wire nuts.
5. Remove screws and take out CO_2 valve.

TO REMOVE LN_2 PACKAGE

1. Unplug chamber power cord.
2. Remove screws holding cover on valve assembly.
3. Remove screws holding valve to standoffs.
4. Remove nut joining inlet tubing to valve.
5. Pull valve away from chamber rear panel and remove wire nuts.

FIGURE 5
COMPONENT REMOVAL

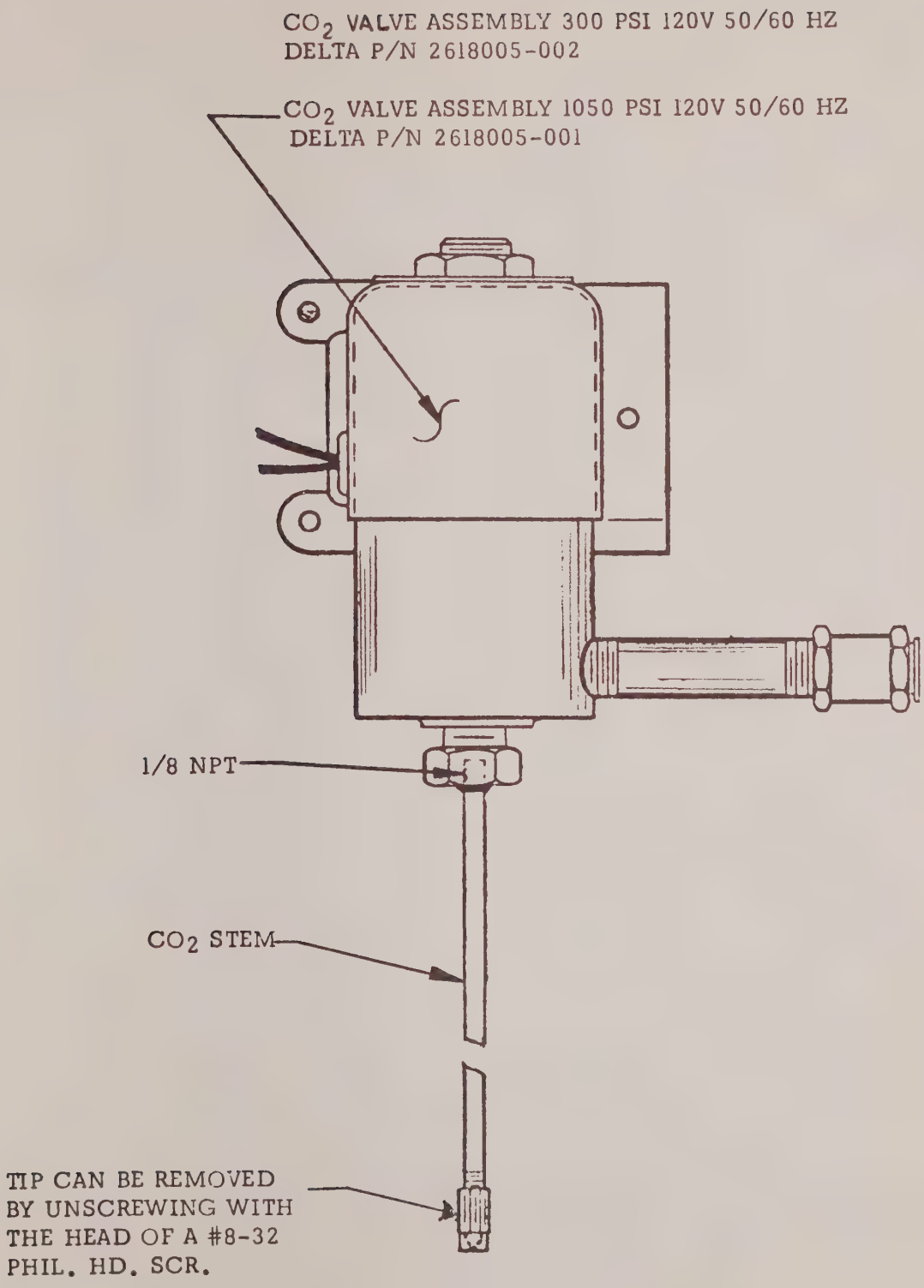

CO_2 VALVE ASSEMBLY 300 PSI 120V 50/60 HZ
DELTA P/N 2618005-002
CO_2 VALVE ASSEMBLY 1050 PSI 120V 50/60 HZ
DELTA P/N 2618005-001
1/8 NPT
CO_2 STEM
TIP CAN BE REMOVED
BY UNSCREWING WITH
THE HEAD OF A #8-32
PHIL. HD. SCR.

FIGURE 6

CO_2 Valve Assembly

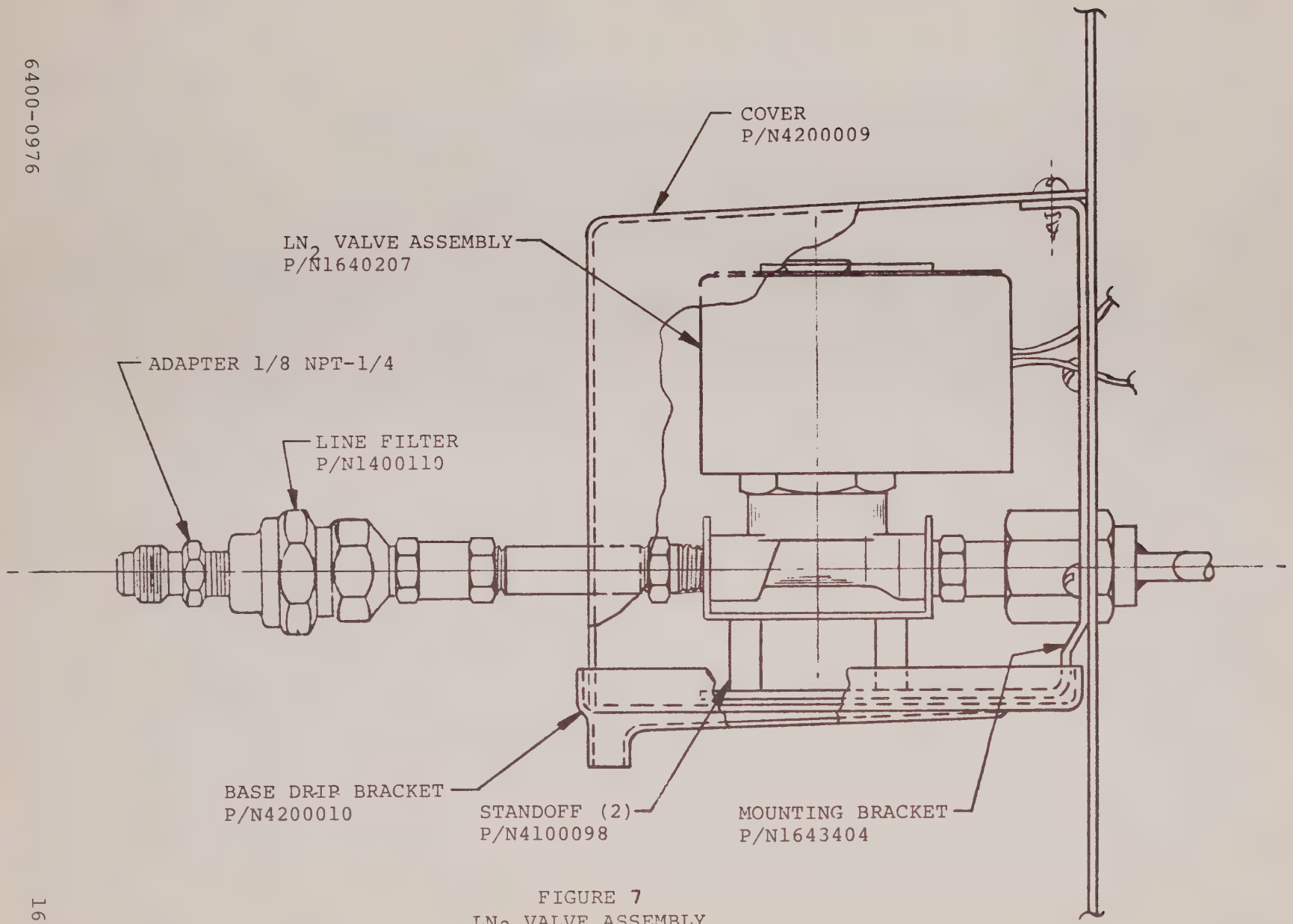


FIGURE 7
LN_2 VALVE ASSEMBLY

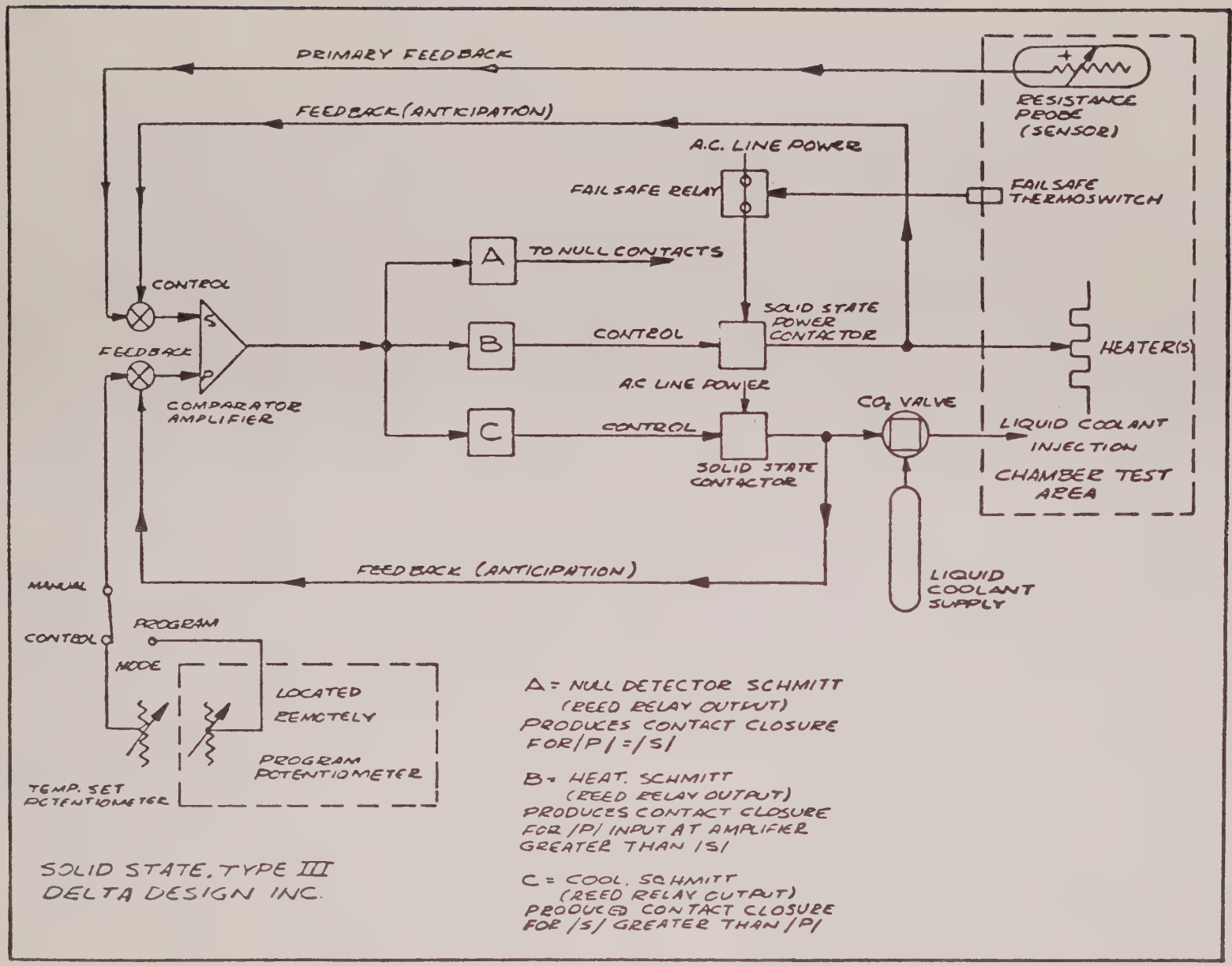
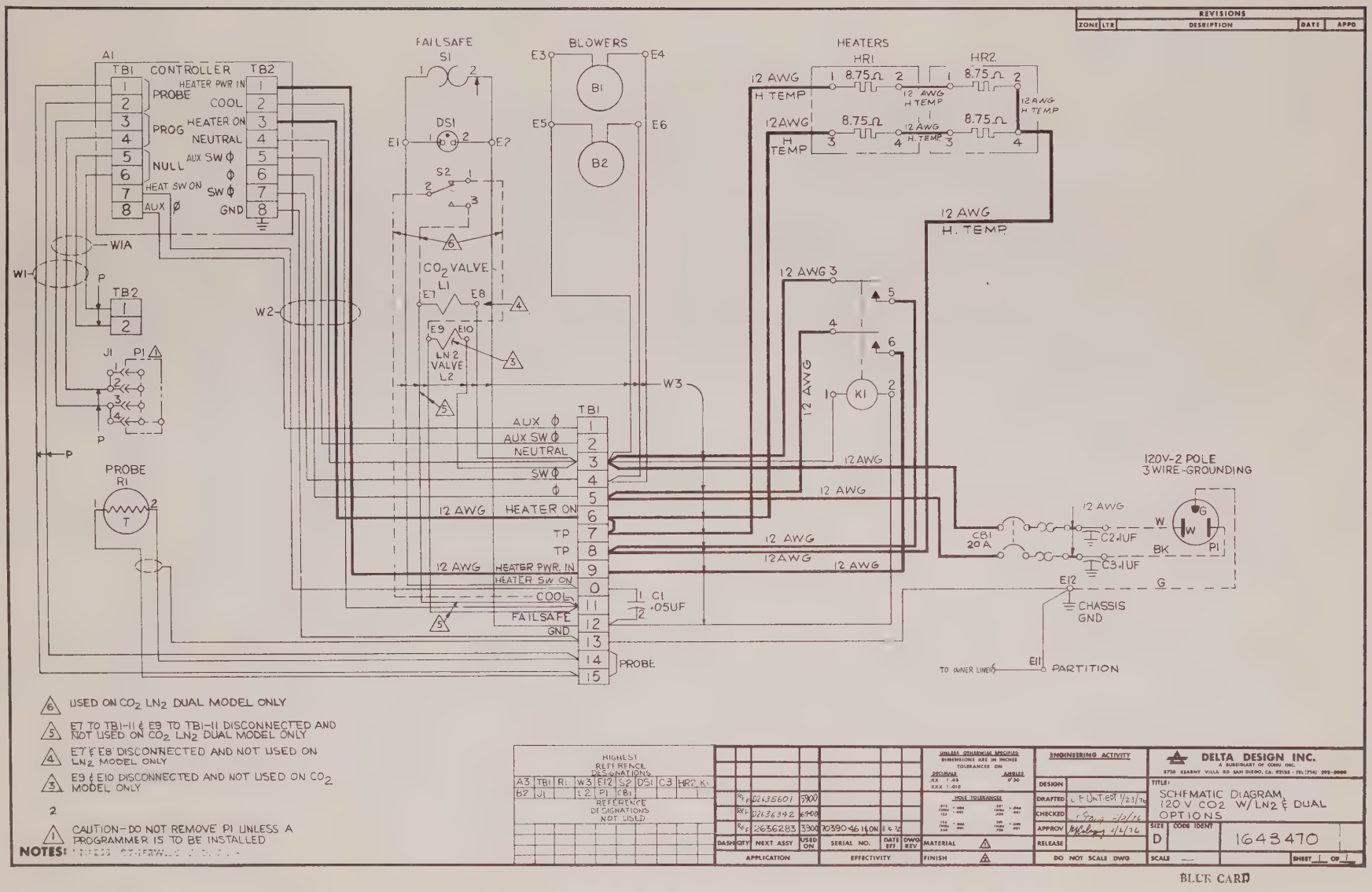
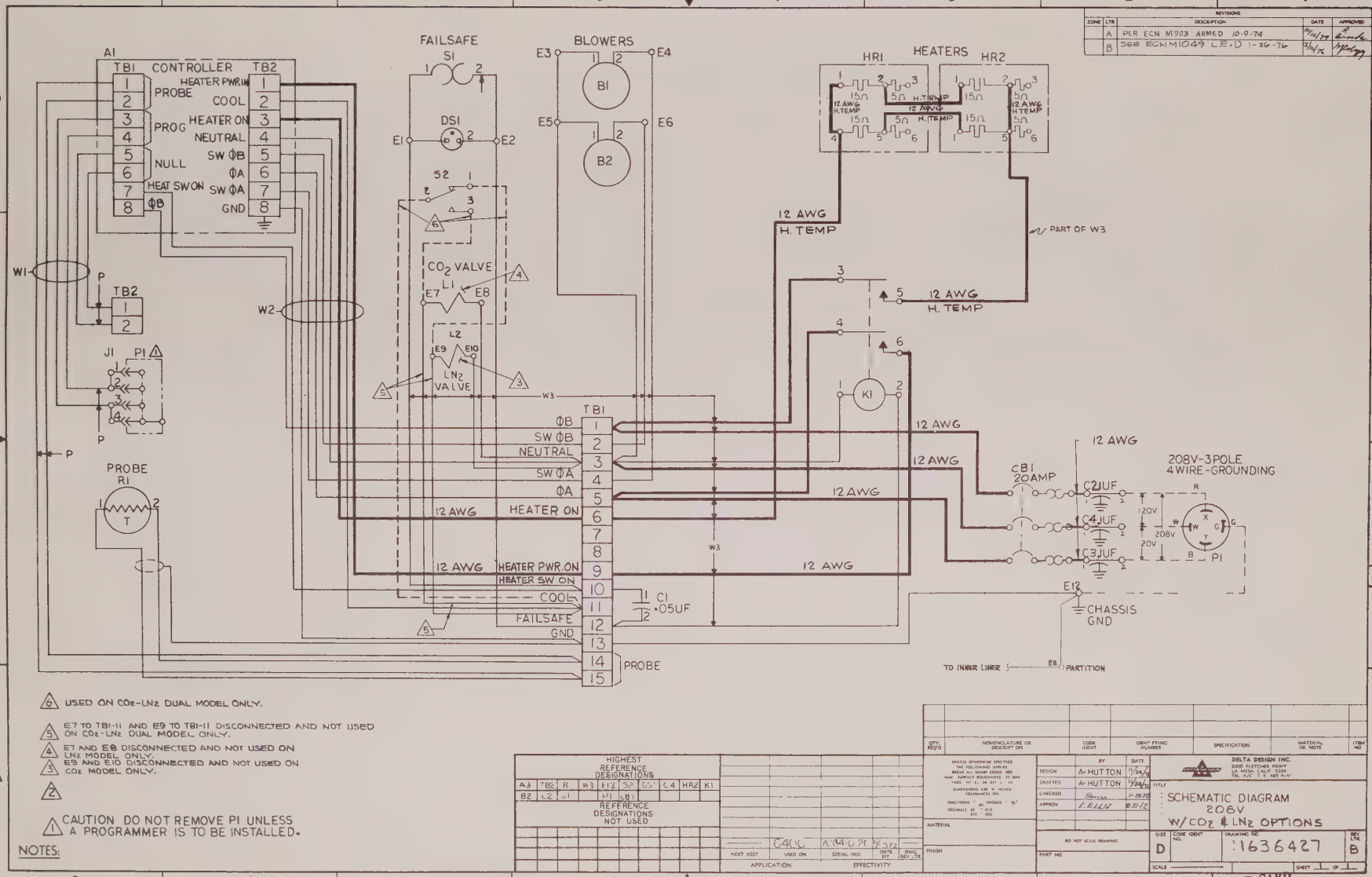


FIGURE 8

Temperature Control System


REVISIONS
ZONE LTR DESCRIPTION DATE APPD
A1
TB1 CONTROLLER TB2
HEATER PWR IN
PROBE
COOL
PROG
HEATER ON
NEUTRAL
NULL
AUX SW Φ
Φ
HEAT SW ON
SW Φ
AUX
Φ
GND
FAILSAFE
S1
DS1
S2
BLOWERS
B1
B2
HEATERS
HR1
HR2
8.75Ω
12 AWG
H TEMP
W1A
W1
W2
W3
TB2
J1 P1
P
PROBE
R1
T
CO2 VALVE
L1
LN2 VALVE
L2
E1 E2 E3 E4 E5 E6 E7 E8 E9 E10
TBI
AUX Φ
AUX SW Φ
NEUTRAL
SW Φ
Φ
12 AWG HEATER ON
TP
TP
12 AWG HEATER PWR. IN
HEATER SW ON
COOL
FAILSAFE
GND
PROBE
C1
.05UF
K1
CB1
20A
C2 .1UF
C3 .1UF
120V-2 POLE
3 WIRE-GROUNDING
W
BK
G
P1
E12
CHASSIS
GND
E11
TO INNER LINER
PARTITION
6 USED ON CO2 LN2 DUAL MODEL ONLY
5 E7 TO TBI-11 & E9 TO TBI-11 DISCONNECTED AND NOT USED ON CO2 LN2 DUAL MODEL ONLY
4 E7 & E8 DISCONNECTED AND NOT USED ON LN2 MODEL ONLY
3 E9 & E10 DISCONNECTED AND NOT USED ON CO2 MODEL ONLY
2
1 CAUTION-DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED
NOTES:
HIGHEST REFFERENCE DESIGNATIONS
A3 TBI R1 W3 E12 S2 DS1 C3 HR2 K1
B2 J1 L2 P1 (B1)
REFERENCE DESIGNATIONS NOT USED
REF 02435601 5900
REF 02436342 6900
REF 26362B3 3900 70390-46 16 ON 8 & 12
DASH QTY NEXT ASSY USED ON
SERIAL NO.
DATE EFF
DWG REV
APPLICATION
EFFECTIVITY
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS XX ±.03 XXX ±.010
ANGLES 0°30
HOLE TOLERANCES
MATERIAL
FINISH
ENGINEERING ACTIVITY
DESIGN
DRAFTED L. F. UNTEST 1/23/76
CHECKED J. Spaig 1/2/76
APPROV Whitney 4/2/76
RELEASE
DO NOT SCALE DWG
SCALE —
DELTA DESIGN INC.
A SUBSIDIARY OF CONTROL INC.
8738 KEARNY VILLA RD SAN DIEGO, CA. 92123 - TEL (714) 292-8000
TITLE: SCHEMATIC DIAGRAM 120V CO2 W/LN2 & DUAL OPTIONS
SIZE D
CODE IDENT
1643470
SHEET 1 OF 1

BLUE CARD



6 USED ON CO_2-LN_2 DUAL MODEL ONLY.

5 E7 TO TB1-11 AND E9 TO TB1-11 DISCONNECTED AND NOT USED ON CO_2-LN_2 DUAL MODEL ONLY.

4 E7 AND E8 DISCONNECTED AND NOT USED ON LN_2 MODEL ONLY.

3 E9 AND E10 DISCONNECTED AND NOT USED ON CO_2 MODEL ONLY.

2

1 CAUTION DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED.

NOTES:

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PER ECN M903 AHMED 10-9-74	10/10/74	
	B	SEE ECN M1049 L.E.D 1-26-76	2/11/76	

HIGHEST REFERENCE DESIGNATIONS

A3	TB2	R	W3	E12	S2	DS1	C4	HR2	K1
B2	L2	J1		P1	CB1				

REFERENCE DESIGNATIONS NOT USED

QTY. REQ'D	NOMENCLATURE OR DESCRIPTION	CODE IDENT	IDENTIFYING NUMBER	SPECIFICATION	MATERIAL OR NOTE	ITEM NO

	BY	DATE
DESIGN	A. HUTTON	11/24/71
DRAFTED	A. HUTTON	11/24/71
CHECKED		11-28-72
APPROV	P. ELLIS	11-31-72

DELTA DESIGN INC.
8500 FLETCHER PKWY
LA MESA, CALIF. 92041
TEL. A/C 714 465 9441

TITLE: SCHEMATIC DIAGRAM 208V W/ CO_2 & LN_2 OPTIONS

SIZE D | CODE IDENT NO. | DRAWING NO. 1636427 | REV. LTR. B

SCALE | SHEET 1 OF 1

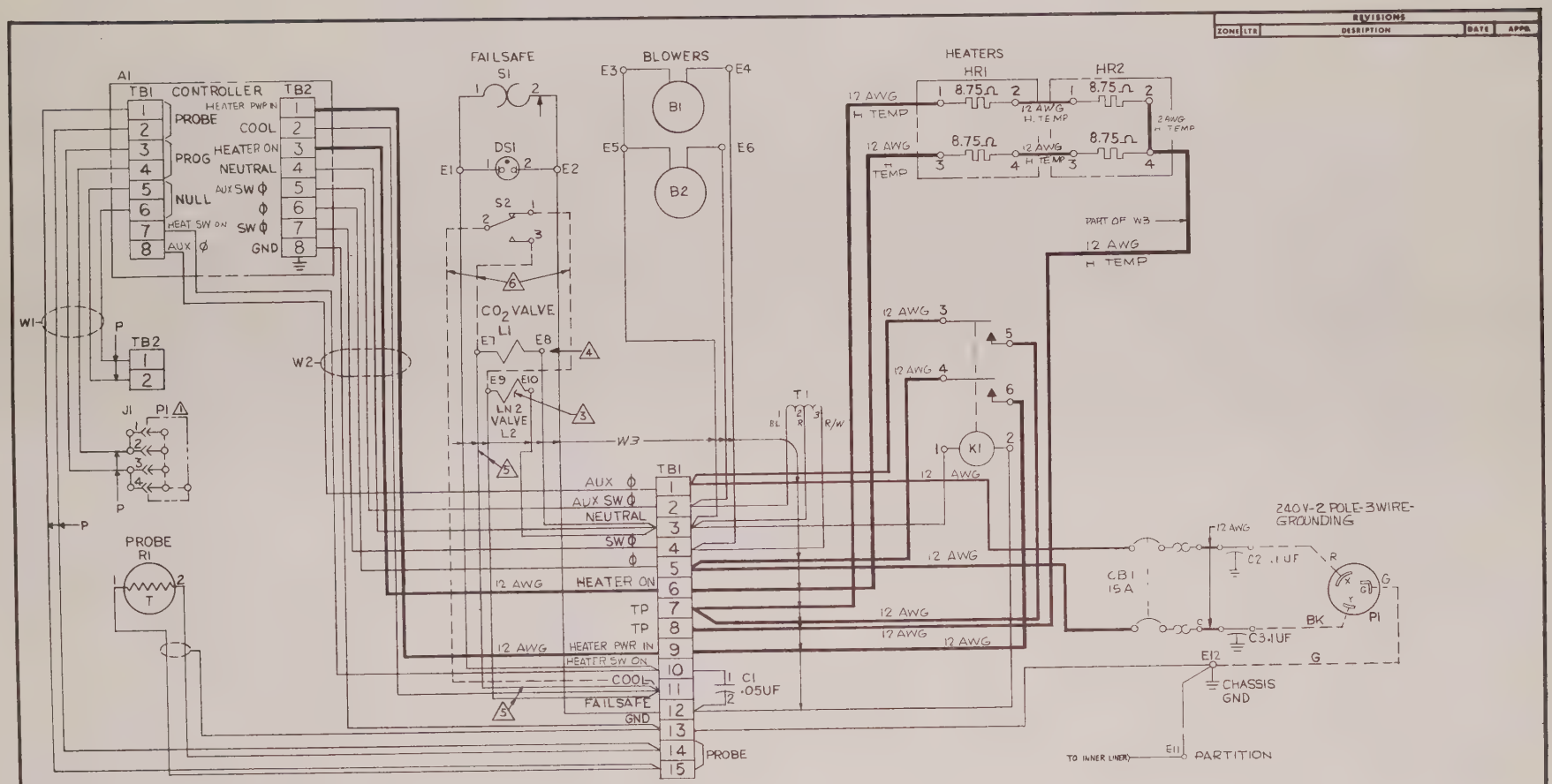
MATERIAL | FINISH | DO NOT SCALE DRAWING | PART NO

NEXT ASSY | USED ON | APPLICATION | SERIAL NOS | DATE EFF | DWG REV. LTR | EFFECTIVITY

UNLESS OTHERWISE SPECIFIED THE FOLLOWING APPLIES: BREAK ALL SHARP EDGES .005 MAX SURFACE ROUGHNESS 125 RMS

DIMENSIONS ARE IN INCHES. TOLERANCES ON FRACTIONS ± 1/64 ANGLES ± 1° DECIMALS .XX ± .010 .XXX ± .005

BLUE CARD



NOTES:

1. CAUTION-DO NOT REMOVE P1 UNLESS A PROGRAMMER IS TO BE INSTALLED
2.
3. E9 & E10 DISCONNECTED AND NOT USED ON LN_2 MODEL ONLY
4. E7 & E8 DISCONNECTED AND NOT USED ON LN_2 MODEL ONLY
5. E7 TO TB1-11 & E9 TO TB1-11 DISCONNECTED AND NOT USED ON CO_2 LN_2 DUAL MODEL ONLY
6. USED ON CO_2 LN_2 DUAL MODEL ONLY

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPD.

HIGHEST REFERENCE DESIGNATIONS

A3	TB1	R1	W3	E12	S2	DS1	C3	HR2	K1	
B2	J1		L2	P1	CB1					

REFERENCE DESIGNATIONS NOT USED

DELTA DESIGN, INC.
5725 KEARNY VILLA RD
SAN DIEGO, CA. 92123
TEL. (714) 292-5000

NOTES: 1. SH 1, 2, 3 & 4 ARE "D" SIZE. (5) TO BE SHIPPED WITH CHAMBER
(1) THESE DWGS ARE FOR OPTIONAL EQUIP. ONLY AND ARE NOT PART OF BASIC CHAMBER ASSY.
(3) USE ONLY AS REQ'D TO OPTIMIZE SEAL (4) 300 PSI USE 2618017-003

ITEM	QTY	DRAWING NUMBER		DESCRIPTION	MANUFACT AND NO	STK OR PART NO.	FAB CODE
00		D2636342		CHAMBER ASSEMBLY		2636342	16
00	REF	D1636427	(2)	SCHEMATIC DIAGRAM 208V			80
00	REF	D1643471		SCHEMATIC DIAGRAM 240V			80
00	REF	D1643470		SCHEMATIC DIAGRAM 120 V			80
00	REF	D1643453		CO_2 TO LN_2 CHMB CONVERSION ASSY		1643453-002	80
00	REF	D2639169		CO_2 & LN_2 DUAL CONVERVERS			80
~~00~~	~~REF~~	~~C1040222~~		~~LN2 INSTAL ASSY VALCOR VALVE (IN FIELD)~~		~~1040222-009~~	
01	1	D2636322		PARTITION ASSEMBLY		2636322	11
02	1	D2636323		PANEL, REAR		2636323	11
03	1	D1636324		PANEL, FRONT		1636324	11
04	1	D1636325		PANEL, TOP		1636325	11
05	1	D2636326		PANEL ASSEMBLY, BOTTOM		2636326	11
06	1	D1636327		PANEL, LEFT		1636327	11
07	1	D2636328		PANEL ASSEMBLY, RIGHT		2636328	11
08	1	D2636331		BEZEL ASSEMBLY		2636331	11
09	1	D2636341		INNERLINER ASSEMBLY		2636341	11
~~10~~	~~1~~	~~A1634770~~		~~PANEL, TUBE RETAINER~~		~~1634770~~	~~21~~
~~11~~	~~1~~	~~A1634772~~		~~GASKET, TUBE~~		~~1634772~~	~~11~~
12	1	A1602967		OUTER PLATE, VENT		1500553	70
13	1	A1602968		GASKET, VENT		2400063	70
14	1	B1640309		WELD ASSY - TUBE GUIDE		1640309-001	
15	AR			GASKET, STRIPS, 1/16 THK		2400019	90
16	2	C1635605		LATCH, KEEPER		1100051	70
17	1	B2619064		LN_2 INJECTOR ASSY		2619064-002	11
18	A/R	B1600091	(3)	SHIM, KEEPER		1600091	21
19	1	B1636330		BLOCK, SUPPORT		1636330	11

CONTINUED ON SHEET 4 (REVLIR K LON)

REV	DATE	BY	APPD	DESCRIPTION
G		R Brooks	EEN	PER ECN M547
H	6-10-74	E OLEJNIK	N Bell	PER ECN M717
J	6-19-74	OLEJNIK	N Bell	PER ECN M730
C		OLEJNIK		ADDED DASH NOS TO ITEMS 43 & 44 ALLED ITEM 79 ECN 213
D		KNAPP	E.E.	PER ECN M239
E		OLEJNIK		PER ECN M403

TITLE: CHAMBER ASSEMBLY 6400

BY	D. HAWN	8/1/72
CHK	Hawn	11-28-72
APPD	L. ELLIS	11-28-72

NEXT ASSY P/L: END ITEM

P/L 2636342 REV P SHT 1 OF 5

DELTA DESIGN, INC. | Parts List No. 2636342 REV N | Sheet 2 of 5

Item	Qty	Drawing Number	Description	Manufacturer and Part No.	Stock No.	Fab. Code
20	2	B1600004	COVER BLOWER		1600004	21
21	8		SPACER, 1/2" LONG		4100093	70
22	4		FOOT		1500419	70
23	A/R		INSULATION, FIBERGLASS		2400025	90
24	A/R		INSULATION, PRESSTITE		2400026	90
25	1		PLUG (1-1/4" DIA HOLE)		1700142	70
26	1		PLUG (1/2" DIA HOLE)		3600081	70
27	1		THERMOMETER, 8"		2300011	70
28	1	B1600136	CUP, THERMOMETER		1600136	21
29	1	A1600076	BUSHING, THERMOMETER		1600076	21
30	1	B2602503	THERMOSWITCH ASSY S1		2300004	70
31	1		LAMP, NEON DS1		1400082	70
32	2	D2621006	MOTOR, BLOWER B1, B2		2621006	70
33	~~1~~	~~A1636422~~	~~LABEL, ACCESSORY OUTLET~~		~~1636422~~	~~22~~
34	1		RELAY K1		1400218	70
35	1		CAPACITOR .05uF, 400V, C1		0700520-400	70
36	2	B2622524	HEATER ASSY, 8.75 Ω HR1, HR2		2622524-001	21
37	1	B2618018	CO_2 ASSEMBLY		2618018-003	16
38	1		TERMINAL BLOCK TB1		1400572	70
39	1	~~B2635055~~	~~PANEL ASSY, SIGNAL A3~~		~~2635055~~	~~26~~
40	~~1~~	~~C2635059~~ A2	~~PANEL ASSY, POWER~~ 208 V ~~A2~~		~~2635059~~	~~26~~
41	1		PROBE R1		2300031	70
42	~~1~~		~~OUTLET, CONVENIENCE J1~~		~~1500083~~	~~70~~
43	1	A2635264-002	CABLE ASSY W1		2635264-002	27
44	1	A2635265-001	CABLE ASSY W2		2635265-001	27
45	1	A2636426	CABLE ASSY 208 V W3		2636426	27
46	~~2~~		~~FUSE 15A~~		~~1400037~~	~~70~~
47	2	A1635610	SPACER		1635610	11
48	1		GROMMET, 1/2"		1500032	90
49	6		CABLE TIE		1500013	90
50	6		PUSHMOUNT		1500014	90
51	1	B1640100	FLEXIDRIVE		1640100	70
52	1	B1636329	EXTENSION, FLEXIDRIVE		1636329	11
53	1		COUPLING, FLEXIDRIVE		1500450	90
54			#6 RUBBER STOPPER		1500255	30

DELTA DESIGN, INC. | Parts List No. 2636342 REV N | Sheet 3 of 5

Item	Qty	Drawing Number	Description	Manufacturer and Part No.	Stock No.	Fab. Code
55	4		SCREW, #4 x 1/2 PHPSM		6904122-400	90
56	2		SCREW, #4 x 1/2 FHPSM		6904122-100	90
57	2		SCREW, #4-40 x 5/8 PHPM		6804405-824	90
58	1		SCREW, #4-40 x 1/4 PHPM		6804401-408	90
59	45		SCREW, #6 x 1/2 PHPSM		6906122-400	90
60	20	(21 REQD 208V ONLY)	SCREW, #6-32 x 1/2 PHPM		6806321-224	90
61	20		SCREW, #6 x 82° x 1/2 OHPSM		6906122-200	
62	2		GROMMET		1500026	
63	1	B1643369	GASKET, TUBE		1643369	
64	16		SCREW, #8 x 82° x 1/2 OHPSM		6908122-200	90
65	4		SCREW, #8-32 x 82° x 1/2 OHPM		6808321-222	90
66						
67	4		SCREW, #10-32 x 5/8 PHPM			90
68	4		SCREW, #10-32 x 3/4 ALLEN CAP		6810325-824	90
69	1				6810323-428	
70	11	(12 REQD 208V ONLY)	WASHER, #6 LOCK		6606011	90
71	4		WASHER, #10 FLAT		6601000-	90
72	4		WASHER, #10 LOCK		6601011	90
73	1		NUT		1500735	70
74						
75	8		SOLDERLESS TERMINAL RING		1500062	90
76	1		SOLDERLESS TERMINAL, SPADE		1500055	90
77	6		WIRE NUT, SMALL		1500028	90
78	2		SOLDERLESS TERMINAL, RECEPTACLE		1500047	90
79	1	A2635607-002	CABLE ASSY. 240V		2635607-002	17
80	1	A2635833-003	CABLE ASSY. 125V		2635833-003	17
81	A/R		WIRE, TEFLON 18 AWG		1500387	90
82	~~A/R~~		~~WIRE, TEFLON 14 AWG~~		~~1500380~~	~~90~~
83	~~1~~	~~C2635058~~	~~POWER PANEL 125V~~		~~2635058~~	
84	1	~~C2635053~~ (2)	~~POWER PANEL 240V~~		~~2635053~~	
00	REF	D1640085 (2)	OPTION, CO_2 TO LN_2 FAILSAFE ASSY		1640085-001	
00	REF	D1640085 (2)	OPTION, CO_2/LN_2 FAILSAFE DUAL ASSY		1640085-002	

FORM 4-17-72

DELTA DESIGN, INC.
5725 KEARNY VILLA RD
SAN DIEGO, CA. 92123
TEL. (714) 292-5000

NOTES:

⚠6 QTY 2 REQD FOR 120V BASIC CHAMBER ASSY & 240V CONVERSION
QTY 3 REQD FOR 208V CONVERSION

ITEM	QTY	DRAWING NUMBER	DESCRIPTION	MANUFACT AND NO.	STK OR PART NO.	FAB CODE
85	2		WASHER #10 LOCK		6610010-000	
86	1		#10-32 X 3/4 PHP-MS		6810323-404	
87	4		#10 FLAT WASHER		6610000-000	
88	2		#10-32 HEX NUT		6710320-000	
89	4		SCREW #6 X 1/2 PHPSM		6906126-400	
90	1	⚠5 2618020	SHIP KIT		2618020-001	
91	1	E1K-3368	GUIDE TUBE VENT		1643368	
92	4		SCREW #6-32 X 3/8 PHP-MS ST-NP		6806323-824	
93	6		NUT #6-32 ST-NP		6706322-000	
94	1		SOCKET J1		2000044	70
95	1		TERMINAL BLOCK TB2		1400509	
96	1	⚠2	CIRCUIT BREAKER CB1 208V	AM3-A3-A-20-3	1400001	
97	4	(6 REQD FOR 208V)	6-32 X 1/4 PHPMS			
98	⚠6	A2635048	CAPACITOR C2, C3 (C4=208V ONLY)		2635048	
99	1	⚠2	STRAIN RELIEF 208V		1500079	
100	8.5 FT	⚠2	POWER CORD 208V		1500465	
101	1	⚠2	PLUG, POWER 208V		2000132	
102	4	(6 REQD FOR 208V)	SOLDERLESS TERMINAL (RING		1500071	
103	1		PLUG, POWER 120V		2000135	
104	1		SOLDERLESS TERMINAL (RING)		1500056	
105	A/R		WIRE, 12 AWG		1500376	
106	A/R		WIRE, 12 AWG HIGH TEMP	12958/J853LG5-1	150144	
107	1	⚠2	PLUG, POWER 240V		2000224	
108	2		SCREW, 6-32 X 3/4 PHPMS			
109	1	A1600012	NULL TERMINAL COVER		1600012	
110	1		PLUG, P1		2600409	

REVISIONS

REV	DATE	BY	APPD	DESCRIPTION
K	8-9-74	P.H. GORDON	R Reed	PER ECN M800
L	10-9-74	A.H. [illegible]	R[illegible]	PER ECN M903
M	9-16-75	R[illegible]	P[illegible]	PER ECN M1025
N	1-28-76	L. [illegible]	F[illegible]	PER ECN M1049
P	8-22-77	RANGE	[signature]	PER ECN M1233

TITLE: SEE SHT 1

BY	P.H. GORDON	8-9-74
CHK		
APPD		

NEXT ASSY P/L

P/L 2636342 REV P SHT 4 OF 5

DELTA DESIGN, INC.

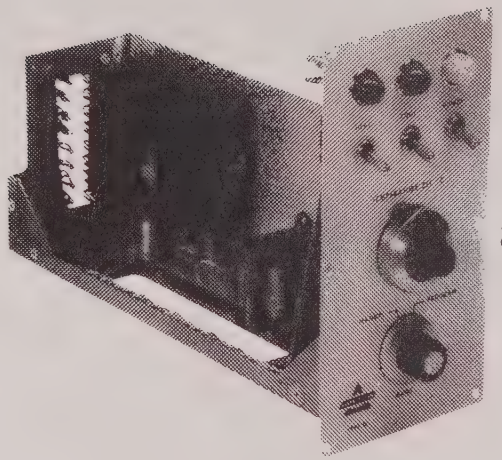
Parts List No. 2636342 REV N

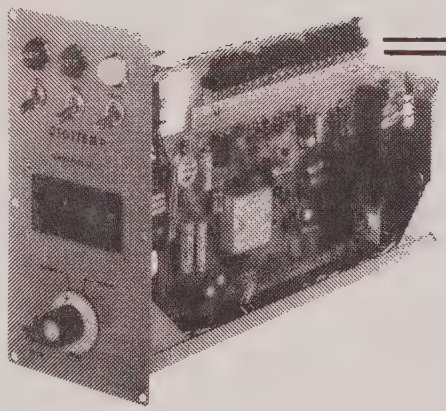
Sheet 5 of 5

Item	Qty.	Drawing Number	Description	Manufacturer and Part No.	Stock No.	Fab. Code
111	1	2	CIRCUIT BREAKER CB1 240V	AM2-A3-A-15-2	1400002	
112	8.5Ft		CORD, POWER 240V, 120V		1500394	
113	2		STRAIN RELIEF 240V, 120V		1500077	
114	2		SCREW 4-1/4 PHPSM			
115	1	B1643476	IDENT. PLATE		1643476	
116	1		CIRCUIT BREAKER CB1 120V		1400008	
117	1		TRANSFORMER T-1 240 V		1636487	

INSTRUCTION MANUAL

Model A1160
A1161
A1172
A1778
A1779





DELTA DESIGN INC

TYPE III CONTROLLERS

and Type III with DIGITEMP®

ENVIRONMENTAL CONTROL EQUIPMENT FOR RESEARCH AND INDUSTRY
5725 KEARNY VILLA ROAD • SAN DIEGO, CALIFORNIA 92123

Type III-0879

Printed in U.S.A.

SPECIFICATIONS

DESCRIPTION OF MODEL NUMBER AND POWER REQUIREMENTS (Power derived from temperature chamber or handler)

A1160 - Type III, 120 VAC, 50/60 Hz, Single Phase.

A1161 - Type III, 208/240 VAC, 50/60 Hz, Single Phase.

A1172 - Type III, 208/240 VAC, 50/60 Hz, Single Phase - For use with Model 7650 Temperature Chamber.

A1778 - Type III with DIGITEMP® , 120 VAC, 50/60 Hz, Single Phase.

A1779 - Type III with DIGITEMP® , 208/240 VAC, 50/60 Hz, Single Phase.

TEMPERATURE RANGE TYPE III

(120V)	(208/240V)	(208/240 for 7650)		(Front Panel)
A1160-1	A1161-1	-	-100°F to +600°F	Vertical
-	-	A1172-2	-100°F to +600°F	Horizontal
A1160-3	A1161-3	-	-73°C to +315°C	Vertical
-	-	A1172-4	-73°C to +315°C	Horizontal
A1160-5	A1161-5	-	-300°F to +600°F	Vertical
-	-	A1172-6	-300°F to +600°F	Horizontal
A1160-11	A1161-11	-	-184°C to +315°C	Vertical
-	-	A1172-12	-184°C to +315°C	Horizontal
A1160-17	A1161-17	-	-100°F to +350°F	Vertical
A1160-19	A1161-19	-	-73°C to +177°C	Vertical

TEMPERATURE RANGE TYPE III WITH DIGITEMP®

(120V)	(208/240V)		(Front Panel)
A1778-1	A1779-1	-73°C to +299.9°C	Vertical
A1778-2	A1779-2	-73°C to +299.9°C	Horizontal

SPECIFICATIONS (cont)

RESETTABILITY	±0.14°C (±0.25°F)
CONTROL DEVIATION FROM SETPOINT	±0.06°C (±0.1°F)
LINE VOLTAGE STABILIZATION	±0.14°C (±0.25°F) for 105-125 VAC line voltage change. ±0.14°C (±0.25°F) for 200-215 VAC line voltage change. ±0.14°C (±0.25°F) for 220-240 VAC line voltage change.
NULL DETECTOR CONTACT CLOSURE	Air temperature (in chamber) will be within 2°C (3.6°F) of set temperature at 3 minutes after closure occurs.
NULL DETECTOR CONTACT RATING	.5 Amp or 10 Watts max. Contact protection provided by user to protect against inductive loads with P.F. less than .9.
PROGRAM CAPABILITIES	Remotely programmable by utilizing an equivalent resistive network.
CONTROLS	POWER ON-OFF Switch and light COOL ON-OFF Switch and light HEAT ON-OFF Switch and light TEMPERATURE SET Control MANUAL/PROGRAM Control Switch (MODE)
WEIGHT (approx.)	4 Lbs. (1.81 Kg)

NOTE: IT IS RECOMMENDED THAT THIS MANUAL BE READ THOROUGHLY BEFORE CONNECTING EQUIPMENT TO ELECTRICAL POWER SOURCE.

INTRODUCTION

The Delta Design, Inc. Type III and Type III with DIGITEMP® Controllers have been specifically designed for use with Delta Environmental Test Chambers and Handlers.

The Controller provides precision temperature control with time proportioned, full wave triac output to the chamber heaters and coolant valve. The temperature selected is maintained automatically by three modes of Controller operation: (1) application of heat, (2) application of coolant or (3) the absence of both.

A relay contact at the rear of the Controller closes when the temperature reaches the desired point. This contact closure can be used during automatic test programming and in conjunction with Delta's various programmers.

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1 PRINCIPLE OF OPERATION

1.1 Description

1.1.1 With the Controller MODE switch in the MANUAL position, the Controller compares the resistance of a wirewound nickel probe element installed in the temperature chamber, to either the resistance of a TEMPERATURE SET potentiometer (Type III Controller) or to the digital resistance selected by the thumbwheel switches (Type III Controller with DIGITEMP®). With the Controller MODE switch in the PROGRAM position, the probe resistive element is compared to a remote programming resistor supplied by the user.

1.1.2 The Controller will regulate the heat and coolant to maintain the set temperature, resulting in minimum coolant and power consumption.

1.1.3 A typical temperature control system is shown in block diagram form as Figure 1.

1.2 X-1 Option

1.2.1 Available as an option on the Type III Controller is the X-1 option. This provides the operator with a switch which permits selecting calibrated preset temperatures without changing the manual setting of the potentiometer. Turning the MODE control knob clockwise from the MANUAL position past the PROGRAM position engages the preset temperatures. From one to ten preset temperatures are available.

2 INITIAL SETUP

WARNING

Ensure that all sources of power have been removed from the equipment prior to installing, removing or servicing the Controller. The case of the triac switch assembly, located on the Controller, is at power line potential when the POWER switch is on.

2.1 Electrical Connection

2.1.1 Electrical Connection is made between the Controller and the chamber or handler at TB1 and TB2 on the rear of the Controller. For terminal designations see D1635617 for Model A1160, D1635618 for Model A1161, D1635617 and D1639124 for A1778, D1635618 and D1639124 for A1779, and C1643351 for Model A1172.

2.1.2 When the Controller and the chamber or handler are purchased as a unit, the Controller will be installed in the unit and calibrated prior to shipment.

3 STARTING UP PROCEDURE

3.1 Precautions

3.1.1 When the Controller is installed in a temperature chamber or handler and an external programmer is not being used, a safety plug (supplied with the chamber or handler) must be connected at the rear of the unit. This will preclude any accidental high temperature being obtained if the Controller MODE switch is placed in the PROGRAM position with an open PROGRAM input. The safety plug disables the heat and cool circuits of the Controller when the MODE switch is placed in the PROGRAM position.

3.2 Controls - Refer to Figure 2

3.2.1 POWER Switch and Indicator - On position - main power to the unit is on. White light is illuminated when power is on.

3.2.2 COOL Switch and Indicator - On position allows the Controller to apply coolant automatically to reach and maintain selected temperature in the test chamber. Green light is steadily illuminated when the chamber is cooling. Light blinks when the chamber reaches selected temperature below ambient.

3.2.3 HEAT Switch and Indicator - On position allows the Controller to apply coolant automatically to reach and maintain selected temperature in the test chamber. Green light is steadily illuminated when the chamber is cooling. Light blinks when the chamber reaches selected temperature above ambient.

3.2.4 TEMPERATURE SET - Dial or Digital Switches - Chamber operating temperature is set by dialing the TEMPERATURE SET dial to the desired degree. On the DIGITEMP® Controllers, five thumbwheel switches and a decade resistor network have been substituted for the temperature set potentiomater. This enables the operator to more accurately dial in a desired temperature between the limits of -73°C to +299.9°C (See paragraph 3.3 and 3.4 for setting information).

3.2.5 MODE Selector - The MODE selector provides MANUAL operation, remote PROGRAM operation and, if supplied with the X-1 option, selection of preset temperatures. (Reference paragraph 1.2 and 3.2.5.3).

3.2.5.1 MANUAL Position - TEMPERATURE SET dial or digital thumbwheel switch selection determines chamber temperature.

3.2.5.2 PROGRAM Position - Programming resistance connected to the program jack at the rear of the chamber or handler selects chamber temperature when the MODE selector is in this position.

CAUTION

Ensure that the safety plug (located on the rear panel of the chamber or handler) is connected prior to setting the MODE selector to the PROGRAM position. This will preclude the possibility of high temperature being accidentally obtained.

3.2.5.3 X-1 Option - Turning the MODE switch clockwise from the MANUAL position past the PROGRAM position engages the preset temperatures. The first position past PROGRAM corresponds to the number 1 calibration position located on the P.C. Assy atop the Controller center section. Unless specified by the customer on the initial order, the set positions are not labelled. Engraving is available at the factory for any customer designation requirement.

From one to ten preset temperatures are available. For calibration see paragraph 5.5.

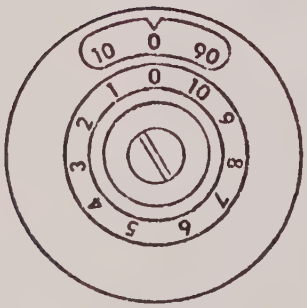
3.3 Setting the Temperature Dial Indicator - Type III Controller

3.3.1 Description - Refer to example A - Set both dials at zero.

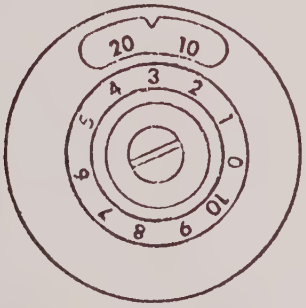
3.3.1.1 One complete rotation of the knob equals 100°. Clockwise is plus (+) degrees (F or C) and counterclockwise is minus (-) degrees. Each rotation of the knob is indicated by the small dial nearest the knob.

3.3.1.2 The large dial indicates each degree, every tenth numbered. Thus, as in example B, the large dial is set at 15, and the small dial is beyond 3, therefore the setting is +315°.

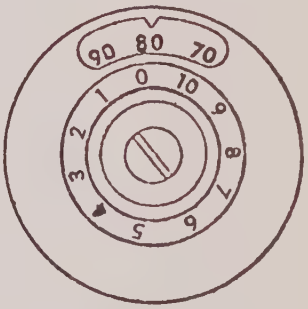
3.3.1.3 When setting to a minus (-) temperature, it is necessary to subtract the degrees from 100, i.e., 20 from 100 equals "80" reading on the large dial to have a setting of -20°. This is shown in example C. It will be noted that the zero on the small dial is just to the left of the marker. Also, on the models having a range greater than -100°, it is necessary to keep track of the counterclockwise rotation of the knob.



A
(0°)



B
(+315°)



C
(-20°)

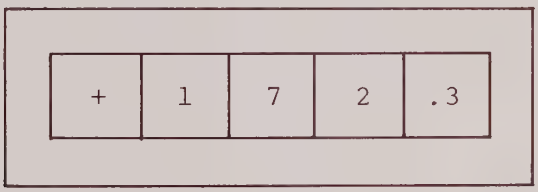
3.4 Setting the Thumbwheel Switches - Type III with DIGITEMP®

3.4.1 Description - Refer to example A.

3.4.1.1 Reading from right to left the first three switch segments are tenths, units, and tens of degrees respectively. These switches each have ten positions and are labeled 0 through 9. The fourth switch segment is the hundreds of degrees and marked 0, 1, and 2.

3.4.1.2 The fifth switch is marked (+), (-), and R. In the (+) position, all settings dialed in on the other segments will be greater than 000.0°C. In the (-) position the inverse will be true. Position R is not functional.

3.4.1.3 The five switches connect the precision resistors applicable to the Controller bridge circuit via the PC resistor board assembly C2605605. Refer to Figure 2-13 for the PC board location.



Example A

4 PROGRAMMING

4.1 Description

4.1.1 With the Controller installed in a temperature chamber or handler, connect the correct resistances between pins 1 and 3 of the program jack. Set the MODE switch to PROGRAM and the HEAT, COOL and POWER switches to the on position. The Controller will regulate heat, coolant or the lack of both to obtain and maintain the programmed temperature.

4.1.2 A safety plug is provided with the chamber or handler and should be kept connected to the PROGRAM input whenever a programmer or actual resistance is not connected. The safety plug disables the heat and cool circuits of the Controller and thus prevents the chamber from accidentally being programmed to a very high temperature.

4.2 Null Detector Circuit

4.2.1 A relay contact closure is provided at the rear of Type III/Type III with DIGITEMP® Controller equipped chambers and handlers. This closure occurs when the chamber temperature reaches the indicated set point. It may be used to signal external equipment that the chamber has reached the selected temperature. Maximum rating of the contact is .5 amps or 10 watts, whichever is greater.

4.2.2 The Delta Design Model 9307, 9308 Hi-Lo Programmer, Model 9311 Ten Step Programmer and the Model 9312, 9313 Hi-Lo-Ambient Programmers utilize the null contacts to start their timers when they are used with the various chambers and handlers. This contact closure feature is most useful in automatic test programming applications.

5 MAINTENANCE

5.1 Theory of Bridge Operation and Adjustments.

5.1.1 The Delta Type III and Type III with DIGITEMP® Controllers utilize a basic four arm bridge in their inputs. In Figure 3, the actual components are represented by a simplified pictorial, in which the generator "G" is representative of a constant current supply and a 60 cycle shunt chopper. The detector "D" represents a high common mode rejection differential amplifier error detector system. The resistance arms R1 thru R4 represent the components in the actual bridge arms. Figure 4 shows the actual components in the bridge. At this point note should be made that there are two small anticipator resistances located in the bridge circuitry. Their magnitude is approximately 10 ohms, and one is located in series with bridge arm R3 while the other is located in series with the probe arm R4. They will be ignored in this discussion as they compensate each other.

5.1.2 The detector "D" is a null (bridge balanced) when the cross products of the bridge arms are equal.

$$R1 \times R4 = R2 \times R3$$

Rearranging terms, we have

$$R4 = \frac{R2}{R1} \times R3$$

If R1 = R2, the bridge balance equation is then R4=R3.

5.1.3 In the actual bridge (Figure 4) R4 is the equivalent temperature probe resistance. A fixed precision resistor, located on the Controller board (905.5 ohms) is in parallel with the actual probe resistance of 140 ohms (typical value at -73°C). The equivalent R4 then becomes

$$\frac{140 \times 906}{140 + 906} = 121 \text{ ohms}$$

Since the fixed resistor is out of the temperature environment, the equivalent resistance will be referred to as probe resistance in the remaining discussion. The expression then becomes approximately equal to

$$121 \text{ ohms} + \left(\frac{.783 \text{ ohms}}{^{o}C}\right) \times \triangle t$$

where $\triangle t$ is the number of °C above the lowest temperature that the system is set up for (typically -73°C). Thus, a value for the probe resistance at 25°C is

$$121 \text{ ohms} + \frac{.783 \text{ ohms}}{^{o}C} \times [25^{o}C - (-73^{o}C)]$$

(cont)

$$= 121 \text{ ohms} + \frac{.783 \text{ ohms}}{^{o}C} \times 98^{o}C$$

$$= 121 \text{ ohms} + 76.7 \text{ ohms}$$

$$= 197.7 \text{ ohms}$$

The probe circuit is linearized and approximates a straight line quite nicely.

5.1.4 For the bridge to be in balance at 25°C, the value of resitance arm R3 must also be equal to 197.7 ohms. The 20 turn trum pot and the 107 ohm fixed resistor sum is adjusted to 121 ohms (which is the value of the probe resistance at the lowest system temperature, -73°C). Thus, the value of the resistance of the TEMPERATURE SET potentiometer or thumbwheel switches for bridge balance at 25°C would be 76.7 ohms. This 76.7 ohms is the increase in resistance of the probe above its "lowest" value.

5.1.5 The bridge balance relationship can be expressed as

$$R3 = R4$$

for T = 25°C.

121 ohms	+	76.7 ohms	=	121 ohms	+	76.6 ohms
Fixed Offset Resistance		TEMP SET pot., thumbwheel switch setting, Programmed Resistance, or X-1 option resistance.		Probe Resistance at -73°C (lowest system temperature)		Probe resistance increase due to difference in temperature between -73°C and +25°C

The above is great for a "perfect probe" and a "perfect" TEMPERATURE SET potentiometer which in real life are quite difficult to obtain (at least at a reasonable production cost). Consequently, both SLOPE and OFFSET adjustments are provided in the bridge to compensate for variations in the potentiometers and probes.

5.1.6 The SLOPE adjustment is a 100 ohm trimpot and allows the magnitude of R2 to be adjusted. The complete bridge balance equation is

$$R1 \times \underbrace{R4}_{\text{Probe}} = R2 \times \underbrace{R3}_{\text{Temp Select}}$$

$$\text{or } R4 = \left(\frac{R2}{R1}\right) \times \underbrace{R3}_{\text{Temp Select}}$$

Thus $(\frac{R2}{R1})$ can be thought of as an adjustable constant, where it is the ratio of two resistances and can be considered as a scaling factor "k".

$$R4 = k \times R3$$

The value of "k" is adjustable by changing the setting of the SLOPE potentiometer in Figure 4. It is adjustable between .883 and 1.05.

$$k = \frac{R2}{R1} = \frac{530 \text{ ohms}}{600 \text{ ohms}} = .883$$

$$k = \frac{R2}{R1} = \frac{630 \text{ ohms}}{600 \text{ ohms}} = 1.05$$

Thus the relationships between the temperature selection circuitry (R3) and the temperature probe (R4) may be adjusted by means of the SLOPE potentiometer. The SLOPE potentiometer is adjusted so as to produce the proper increase in temperature in the system as the temperature is selected by the TEMPERATURE SET potentiometer.

5.1.7 The OFFSET potentiometer is the 20 turn 20 ohm unit and is used to calibrate the bridge for the base resistance of the probe and the "end" resistance of the TEMPERATURE SET potentiometer when it theoretically should be zero at the lowest temperature setting of the system.

5.1.8 A series of figures, representing the relationships between the TEMPERATURE SET dial settings, the actual system temperatures produced and the effect of adjustments of both the SLOPE and OFF-SET potentiometer is included as Figure 5, 6 and 7.

Figure 5 is the Temperature Set vs. System Temperature Transfer Plot and depicts, by the line A A', the proper adjustments of both SLOPE and OFFSET, so as to give proper system temperatures corresponding to the dial settings. Figure 6 shows the effect of changing the OFFSET adjustment in the bridge.

NOTE: CHANGING THE OFFSET DOES NOT CHANGE THE SLOPE OF THE TRANSFER LINE A A'.

Figure 7 shows the effect of changing the SLOPE ADJUSTMENT in the brige.

NOTE: CHANGING THE SLOPE ADJUSTMENT DRASTICALLY EFFECTS THE OFFSET.

Because of the non-interaction of the OFFSET on the SLOPE and the radical interaction of the SLOPE on the OFFSET, first obtain the proper slope adjustment then as a final step, make the OFFSET adjustment when calibrating the Type III controller bridge. Refer to paragraph 5.2 for calibration procedures.

5.2 Temperature Chamber Calibration Data

5.2.1 A tabulation of resistance values, for two temperatures, 65.6°C and 204°C, for each of the types of Delta Design chambers is included here. The differences in resistance values are due to the differences in temperatures between the center of the chamber and location of the probe for each model. Using these figures in the calibration usually results in temperature within 2°C of temperature desired.

TEMPERATURE CHAMBER CALIBRATION DATA

CHAMBER	TEMPERATURE SET	EQUIVALENT PROBE RESISTANCE WITH 905.5 (R65) MOUNTED ON PC BOARD C2637594	EQUIVALENT PROBE RESISTANCE WITHOUT 905.5 (R65) MOUNTED ON PC BOARD C2637594
2300	150°F or 65.6°C	310.3 ohm	231.8 ohm
	400°F or 204°C	544.4 ohm	340.4 ohm
2850	150°F or 65.6°C	310.8 ohm	232.0 ohm
	400°F or 204°C	540.3 ohm	340.3 ohm
3900	150°F or 65.6°C	311.5 ohm	232.1 ohm
	400°F or 204°C	544.0 ohm	342.1 ohm
4115	150°F or 65.6°C	315.4 ohm	-
	400°F or 204°C	563.0 ohm	-
4135 & 4145	150°F or 65.6°C	310.6 ohm	-
	400°F or 204°C	557.4 ohm	-
5900	150°F or 65.6°C	312.3 ohm	232.6 ohm
	400°F or 204°C	554.3 ohm	346.3 ohm
6400	150°F or 65.6°C	311.5 ohm	232.1 ohm
	400°F or 204°C	550.2 ohm	342.5 ohm
7600 & 7650	150°F or 65.6°C	311.4 ohm	232.8 ohm
	400°F or 204°C	545.7 ohm	345.3 ohm
8000 HOT	150°F or 65.6°C	312.1 ohm	-
	400°F or 204°C	550.3 ohm	-
8000 COLD	150°F or 65.6°C	163.6 ohm	-
	400°F or 204°C	550.3 ohm	-
8070, 8071 & 8073	-85°F or -65°C	126.6 ohm	-
	290°F or 143°C	292.0 ohm	-
8195	-85°F or -65°C	130.3 ohm	-
	290°F or 143°C	288.2 ohm	-

5.3 Calibration Procedure - Type III - General - Once the Controller has been initially calibrated, periodic calibration is not normally required. The following procedure may be used when calibration is necessary. The required equipment will be an oscilloscope and precision resistor substitution box such as a General Radio Co. type 1432-T.

WARNING

THE CASE OF THE TRIAC SWITCH ASSEMBLY, LOCATED ON THE CONTROLLER SUBASSEMBLY, IS AT POWER LINE POTENTIAL AND EXTREME CARE IN SERVICING OR CALIBRATION MUST BE EXERCISED.

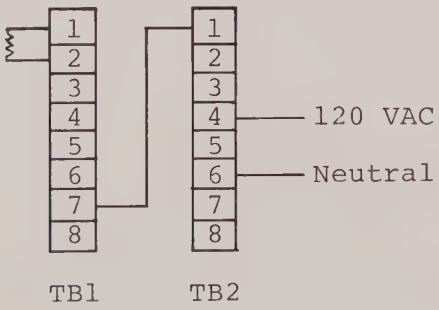
5.3.1 Preparation:

5.3.1.1 Ensure that the Controller HEAT, COOL and POWER switches are in the off position and if the Controller is mounted in a temperature chamber or handler, main power is removed from the unit.

5.3.1.2 Remove the Controller from the chamber or handler and disconnect all electrical connections from TB-1 and TB-2 at the rear of the Controller. Mark cable connections for reconnection.

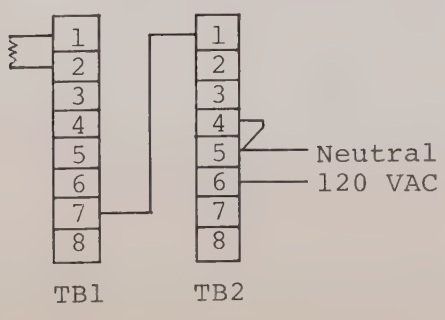
5.3.1.3 Make connections to TB-1 and TB-2 on the bench as follows:

Model A1160 and A1778 (120V)



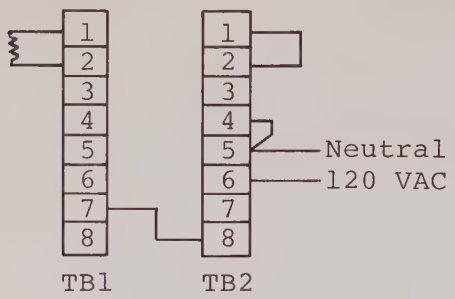
(a) Resistor substitution box between TB1-1 and TB1-2.
(b) Jumper between TB1-7 and TB2-1.
(c) 120 VAC into TB2-4 and TB2-6.

Model A1161 and A1779 (240V)



(a) Resistor substitution box between TB1-1 and TB1-2.
(b) Jumper between TB1-7 and TB2-1.
(c) Jumper between TB2-4 and TB2-5.
(d) 120 VAC into TB2-5 and TB2-6.

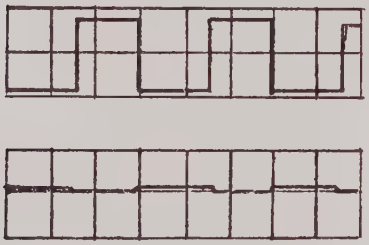
Model A1172 (240V)



(a) Resistor substitution box between TB1-1 and TB1-2.
(b) Jumper between TB1-7 and TB2-8.
(c) Jumper between TB2-1 and TB2-2.
(d) Jumper between TB2-4 and TB2-5.
(e) 120 VAC into TB2-5 and TB2-6.

5.3.1.4 Connect the oscilloscope to R45 at location shown on C2637594. Connect the Ground of the scope to the chassis.

Scope setting: 10V/Cm 5ms/Cm



Out of Null

Null

Waveform Example

5.3.2 General Calibration Procedure:

5.3.2.1 Switch the Controller POWER switch to the on position.

5.3.2.2 If the Controller being calibrated is a Type III with DIGITEMP® , set the digital thumbwheel switches to a reading of -000.0°C. Adjust the resistor substitution box until the square wave pattern portrayed on the scope is nulled out.

5.3.2.3 Set the digital thumbwheel switches to a reading of +000.0°C. Adjust potentiometer (R31) located on PC Board C2605605 until the square wave again nulls out.

5.3.2.4 Set the resistor substitution box to the equivalent probe resistance for 65.6°C as shown in the table in paragraph 5.2.

5.3.2.5 Adjust the TEMPERATURE SET until a null condition occurs. Note whether the setting is above or below 65.6°C.

5.3.2.6 Set the dial or digital thumbwheel switches at 65.6°C.

5.3.2.7 If the null setting occurred below 65.6°C, adjust the SLOPE potentiometer (R33) counterclockwise (refer to Figure 2) until a null condition occurs.

5.3.2.8 If the null setting occurred above 65.6°C, adjust the SLOPE potentiometer (R33) clockwise until a null condition occurs.

5.3.2.9 Set the resistor substitution box to the equivalent probe resistance for 204°C as shown in the table in paragraph 5.2.

5.3.2.10 Adjust the TEMPERATURE SET until a null condition occurs. Note whether the setting occurs above or below 204°C.

5.3.2.11 Set the dial or digital thumbwheel switches at 204°C.

5.3.2.12 If the null setting occurred below 204°C, adjust the OFFSET potentiometer (R11) (refer to Figure 2) counterclockwise until a null condition occurs.

5.3.2.13 If the null setting occurred above 204°C, adjust the OFFSET potentiometer (R11) clockwise until a null condition occurs.

5.3.2.14 Repeat step 5.3.2.4 through 5.3.2.8 and 5.3.2.9 through 5.3.2.13 alternately as many times as necessary to acheive a null condition at each dial setting vs. the recommended values in the table (paragraph 5.2).

5.3.2.15 Turn off power source, remove bench connections and reinstall Controller in applicable unit (chamber or handler).

5.4 Specific Calibration - The calibration procedure and values outlined in paragraph 5.3 for Controller alignment are only approximate and consist of the average values assuming perfect matching of the TEMPERATURE SET potentiometer or digital thumbwheel switches and the temperature probe.

After the Controller is adjusted to a "ballpark" calibration by means of the general procedure as outlined in paragraph 5.3, it can be very precisely calibrated by means of an additional procedure. This procedure, performed with the Controller installed and TB1 and TB2 reconnected, is desirable for systems requiring very accurate temperature control.

5.4.1 Procedure: Refer to and use the Calibration Work Sheet on page 17.

5.4.1.1 Install another temperature sensor (thermocouple, RTD, or thermistor) with the proper sensor leads in the center of the workspace of the chamber and close the chamber door. Connect the leads to the appropriate pyrometer or other suitable temperature measuring device. Set the MODE switch to MANUAL.

5.4.1.2 Switch the POWER, HEAT, and COOL switches to the on position.

P.L. 1648697 REV ____ SHT 5 OF 8
DESCRIPTION DIGITEMP CONTROLLER 120V
NEXT ASSY ____ BY LAH CK'D ____ APPD ____

REV ECN DATE BY APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF.

JOB NO ____ S.O. NO. ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.	JOB QTY	ALL	QTY REC	FAB CD	PURCHASING PO NO	QTY DUE	REC'D	MANUFACTURE ACT	EST ACT	HRS	COM	COM	PLATE/PAINT IN	OUT
38	1	1							CAPACITOR		0700520-400														
39	4	4							6-32 x 1/2 PHP-MS-SST		6806321-204														
40	5	5							6-32 x 3/8 PHP-MS-SST		6806323-804														
41	4	4							4-40 x 3/8 PHP-MS-SST		6804403-804														
42	1	1							6-32 HN-SST		6706320-000														
43	1	1				C	2637594		PC BOARD ASSY TYPE III CONTROLLER		2637594-001														
01	1	1				D	1605624		PC BRD DRILL, CONTROLLER TYPE III		1605624-101														
02	1	1							CAPACITOR C2 50 uf/50V		0704700-050														
03	2	2							CAPACITOR C5, C13, 220 uf/12 V		0722000-012														
04	4	4							CAPACITOR C3, C4, C10, C11, 10uf/25 V		0701000-025														
05	2	2							CAPACITOR C8, C12, 50 uf/25V		0704700-025														
06	3	3							CAPACITOR C6, C7, C9 .01uf/600V		0700120-600														
07	1	1							CAPACITOR C1, 250 uf/50V		0725000-050														
08	3	3							RESISTOR R14, R43, R55, 15K 5% 1/2W		0301530-500														
09	2	2							RESISTOR R36, R40, 3.3K 5% 1/2W		0303320-500														
10	2	2							RESISTOR R59, R64 8.2K 5% 3W		0600005														
11	1	1							RESISTOR R49, 12K 5% 1/2W		0301230-500														
12	3	3							RESISTOR R1, R26, R28, 680Ω 5% 1/2W		0368000-500														
13	1	1							RESISTOR R5, 560Ω 5% 1/2W		0356000-500														
14	2	2							RESISTOR R62, R63, 270Ω 5% 1/2W		0327000-500														
15	2	2							RESISTOR R60, R61, 100Ω 5% 1/2W		0310000-500														
16	1	1							RESISTOR R39, 47Ω 5% 1/2W		0304700-500														
17	2	2							RESISTOR R46, R47 5.6K 5% 1/2W		0305620-500														
18	1	1							RESISTOR R30, 1.5K 5% 1/2W		0301520-500														
19	1	1							RESISTOR R9 600Ω 1% WIREWOUND 1/4W		0400022														
20	4	4							DIODE CR 25 THRU CR28 IN5551		1105551														
21	1	1							RESISTOR R32 530Ω 1% WIREWOUND 1/4W		0400021														
22	5	5							RESISTOR R4, 5, 21, 31, 48 1K 5% 1/2W		0300130-500														
23	5	5							RESISTOR R10, 15, 20, 45, 50 1.2K 5% 1/2W		0301220-500														
24	3	3							RESISTOR R7, R12, R27 2.2K 5% 1/2W		0302220-500														
25	11	11							RESISTOR R8, 16, 22-25, 44, 53, 54, 55, 56, 59 4.7K 5% 1/2W		0304720-500														
26	2	2							RESISTOR R37, R38 6.8K 5% 1/2W		0306820-500														

NOTES:

P/L 1648697

P.L. 1648697 REV ____ SHT 6 OF 8

DESCRIPTION DIGITEMP CONTROLLER 120V

NEXT ASSY END ITEM BY PAT CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD.
SAN DIEGO, CALIF.

JOB NO. ____ S.O. NO. ____

QTY ____ PROM DATE ____ ACT ____

RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.	JOB QTY	ALL	QTY REC	FAB CD	PURCHASING PO NO	QTY	DUE	REC	MANUFACTURE ACT STD	EST HRS	ACT COM	COM	PLATE/PAINT IN	OUT
27	4	4							RESISTOR R17-19, R57 10K	5% 1/2W	0301030-500														
28	2	2							RESISTOR R42, R52 27K	5% 1/2W	0302730-500														
29	1	1							DIODE CR1, N 4004		1104004														
30	13	13							DIODE CR3, 4, 7, 9-17, 24	IN4002	1104002														
31	1	1							DIODE CR2	IN3028	1100022														
32	1	1							DIODE CR6	IN706	1100706														
33	2	2							DIODE CR5, CR23	IN702	1100702														
34	4	4							TRANSISTOR Q6, 12, 16, 23	2N3638	1203638														
35	14	14							TRANSISTOR Q3-5, 7-9, 13-15, 18-22	2N3565	1203565														
36	4	4							TRANSISTOR Q2, 10, 11, 17	2N1302	1201302														
37	1	1							TRANSISTOR Q1	2N1535	1201535														
38	8	8							TRANSISTOR PAD		1500301														
39	1	1							RESISTOR 820 OHM	5% 1/2W	0382000-500														
40	1								~~SWITCH (SCR)~~		~~1400552~~														
41	3	3							RELAY K1-K3	EAC 121AXAIKOF	1400216														
42	21	21							TERMINAL POST		1400550														
43	1	1							SLEEVING		1500105														
44	2	2							6-32 x 3/8 PHP-MS-	SST	6806323-804														
45	2	2							4-40 x 3/4 PHP-MS-	SST	6804403-404														
46	2	2							4-40 x 3/8 PHP-MS-	SST	6804403-804														
47	2	2							6-32 HN-SST		6706320														
48	2	2							#6 FW-SST		6606010														
49	6	6							4-40 HN-SST		6704400														
50	2	2							#4 LWS-SST		6704010														
51	1	1							POTENTIOMETER 20Ω 20 TURN	WIREWOUND	0500038														
52	1	1							POTENTIOMETER 100Ω 20 TURN	WIREWOUND	0500037														
53	1	1				A	1600260		COVER, ANTICIPATOR		1600260														
54	1	1							BRACKET		1600466														
55	4	4							#6 FW-FIBER		6606008														
56	4	4							TERMINAL POST		1400500														

NOTES:

P/L 1648697

P/L 1648697 REV ____ SHT 7 OF 8

DESCRIPTION DIGITEMP CONTROLLER 120V

NEXT ASSY ____ BY ____ CK'D ____ APPD ____

REV ECN DATE BY APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF

JOB NO. ____ S.O. NO ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO	STOCK OR PART NO.	JOB QTY	AUL	QTY REC	FAB CD	PURCHASING PO NO	QTY	DUE	REC	MANUFACTURE ACT STD HRS	EST ACT COM	CCM	PLATE/PAINT IN	OUT	AREA
57	1	1							RESISTOR R65 905 .5 Ω .05%		0400008														
58	REF	REF							F.A. RESISTOR R29		0400018, 190R20														
59	REF	REF							F.A. RESISTORS R3, R6, R35 & R41 CARBON 1/4 W 5%																
60	1	1				B	1643414		BRACKET-SCR SWITCH ASSY		1643414-101														
00																									
00																									
00																									
00																									
00																									
00																									
45	1	1				C	2635445		TRIAC ASSY 120/240	VOLT	2635445-001														
00	REF	REF				C	1635446		SCHEMATIC 120/240	VOLT TRIAC															
00	REF	REF				B	1635443		ARTWORK 120/240	VOLT TRIAC															
00																									
00																									
01	1	1				C	1635444		P.C. BOARD 120/240	VOLT TRIAC	1635444-101														
02																									
03	1	1							INTEGRATED CIRCUIT Z1	RCA CA3079	1000026														
04																									
05	1	1							TRIAC Q1	RCA T4706B ⚠1	124706														
06	1	1							TRANSISTOR Q2	2N3565	1203565														
07	1	1							CAPACITOR 100 uf	12V C1 SPRIGUE	0510147-051														
08	3	3							DIODE CR1, CR2, CR3	1N4004	1104004														
09																									
10	1	1							RESISTOR, 1.2K, 1/4W, 5% R1		4045000-122														
11	1	1							RESISTOR, 8.2K, 1/4 W, 5% R2		4045000-822														
12	1	1							RESISTOR, 4.7K, 1/4 W, 5% R3		4045000-472														
13	2	2							RESISTOR, 10K, 2W 5% R4, R5		0310032-103														
14																									
15	1	1							SOCKET, I/C 14 PIN		1710283-001														
16	1	1				B	1603051		HEAT SINK		1500351														
17																									

NOTES: ⚠1 RCA 40716 MAY BE SUBSTITUTED FOR ITEM 5.

1648697
P/L

P.L. 1648697 REV ____ SHT 8 OF 8

DESCRIPTION DIGITEMP CONTROLLER 120V

NEXT ASSY END ITEM BY PAM CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF

JOB NO ____ S.O. NO. ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO	STOCK OR PART NO.	JOB QTY	ALL	QTY REC	FAB CD	PURCHASING P.O. NO	QTY	DUE	REC	MANUFACTURE ACT STD	EST HRS	ACT COM	ACT CONS	PLATE/PAINT IN	OUT	ARC
18	2	2							6-32 x 1/2 PHP-MS-SST		6806321-204															
19	2	2							#6 LWT-SST		6606020															
20	2	2							6-32 HN-SST		6706320															
21	2	2							STANDOFF, HEAT SINK		1500329															

NOTES:

1648697
P/L

P.L. 1648696 REV ____ SHT 1 OF 8

DESCRIPTION DIGITEMP CONTROLLER 208/240V

NEXT ASSY E.D. ITEM BY FHH CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF

JOB NO. ____ S.O. NO. ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.	JOB QTY	ALL	QTY REC	FAB CD	PURCHASING P.O. NO	QTY	DUE	MANUFACTURE ACT REQ	EST STD	ACT HPS	ACT COM	PLATE/PAINT IN	OUT	AREA
00	X					P/L	1648696		DIGITEMP CONTROLLER 208/240 VOLT (VERTICAL FRONT PANEL) MODEL 1779-1		1648696-001														
00		X				P/L	1648696		DIGITEMP CONTROLLER 208/240 VOLT (HORIZONTAL FRONT PANEL) MODEL 1779-2		1648696-002														
00																									
00																									
00																									
00																									
00																									
00	REF	REF				D	1635619		SCHEMATIC - CONTROL BOARD, TYPE III		CONTROLLER														
00	REF	REF				C	1635446		SCHEMATIC 120/240 VOLT TRIAC																
00	REF	REF				D	1635618		SCHEMATIC DIAGRAM, TYPE III 208/240 VOLT																
00	REF	REF				C	2638511		XI - OPTION ASSY, TYPE III CONTROLLER																
00																									
00																									
00																									
00																									
01	1					D	1631550		VERTICAL PANEL, DIGITEMP		1631550-101														
									AL ALY 6061-T6 x .06 THK																
02		1				C	1637442		HORIZONTAL PANEL, DIGITEMP		1637442-101														
									AL ALY 6061-T6 x .06 THK																
03	1	1				C	2605605		PCB ASSY, RESISTOR - DIGITEMP		2605605-001														
00	REF	REF				D	1639124		WIRING DIAGRAM, 120/240 VOLT MODEL A1778																
00	REF	REF				D	1641191		WIRING DIAGRAM, CONTROL PANEL 80XX SHT 2 (RUN 20)																
00	REF	REF				D	1641261		WIRING DIAGRAM, CONTROL PANEL 80XX (RUN 21 & ON)																
00																									
01	1	1				C	1605604		DRILLING INSTRUCTIONS		1605604														
02	1	1							RESISTOR, WIREWOUND R-30		0400006														
									57.65 Ω 01%																
03	2	2							STANDOFF 3/8"	CAMBION 1300-12	4100096														
04	9	9							RESISTOR WIREWOUND .081 Ω 10%	R1-R9	0400002														

NOTES:

1648696
P/L

P.L. 1648696 REV ____ SHT 2 OF 8
DESCRIPTION DIGITEMP CONTROLLER 208/240V
NEXT ASSY END ITEM BY ____ CK'D ____ APPD ____

REV ECN DATE BY APP

DELTA DESIGN
5725 KEARNY VILLA RD.
SAN DIEGO, CALIF.

JOB NO. ____ S.O. NO. ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.	JOB QTY	ALL	QTY REC	FAB CD	PURCHASING P.O. NO	QTY. DUE	REQ'D	MANUFACTURE ACT STD. HRS	EST ACT COM.	COM.	PLATE/PAINT IN	OUT	AREA
05	9	9							RESISTOR, WIREWOUND .81 Ω 1%	R10-R18	0400003													
06	9	9							RESISTOR, WIREWOUND 8.1 Ω 1%	R19-R27	0400004													
07	2	2							RESISTOR, WIREWOUND 81 Ω .01%	R28-R29	0400005													
08	1	1							TRIMPOT R31,	BOURNS 3367 P-100	0500027													
09	35	35							EYELET, E.B. STAMP	SOW A-2059	2010184-017													
10	1	1					1605603		ARTWORK RESISTOR	BOARD P.C.	1605603													
11	1	1							DIGISWITCH ASSY S2-S6 (SEE D1639124) DIGITRAN # 3D-145B		1400197													
12	25	25							WIRE 20 AWG		1500389													
00																								
00																								
04	1	1					2600010		CENTER ASSY		2600010-001													
01	1	1					2600235		CENTER BRACKET ASSY		2600235													
00																								
00																								
00																								
00																								
02	1	1					2600413		SCR SWITCH ASSY		2600413													
00																								
00																								
00																								
00																								
03	1	1							TERMINAL BLOCK (2 PIN) CINCH-JONES	# 2-140	1400508													
04	1	1							FUSE HOLDER, LITTLE FUSE	# 356001	1400053													
05	1	1							TRANSFORMER, SPARTON	#TCS-10718	1400283													
06	1	1							GROMMET, 9/16 x 1/4 V WALSEO #	INYL 7034-6	1500026													
07	1	1							RESISTOR, 3.3K-1/2 W	- 5%, STACKPOLE	03033205													
08	1	1							TERMINAL STRIP, (2) PLACE,	H.H. SMITH 1088	1400524													

NOTES:

1648696
P/L

P.L. 1648696 REV ____ SHT 3 OF 8

DESCRIPTION DIGITEMP CONTROLLER 208/240V

NEXT ASSY END ITEM BY ~~FAH~~ CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF

JOB NO. ____ S.O. NO ____

QTY ____ PROM DATE ____ ACT ____

RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO	STOCK OR PART NO.
09	9	9							#4 FW - FIBER		6604008-000
10	6	6							6-32 x 1/2 PHP-MS	-SST	6806321-204
11	1	1							6-32 x 3/8 OHP-MS	-SST	6806323-802
12	3	3							6-32 x 3/8 PHP-MS	-SST	6806323-804
13	2	2							#6 FW-SST		6606000-000
14	1	1							#6 LWS-SST		6606010-000
15	1	1							BUSS WIRE 20 GA 2"		1500412
									STD. WIRE & CABLE # 4-862T		
16	1	1							WIRE, 14 GA "E" TEFLON 3"		1500380
									STD. WIRE & CABLE		
17	1	1							LUG, 22-16GA FL. SP. TONGUE		1500055
									AMP # 322249		
00											
00											
00											
05	1	1							TERMINAL BLOCK		1400508
06	1	1							TERMINAL STRIP		1400505
07	1	1							TRANSFORMER		1400299
08	1	1							DIODE		1104004
09	1	1							RESISTOR		0303320-500
10	2	2							GROMMET		1500026
11	14	14							NUT, SWAGE		1700029
12	4	4							6-32 x 1/2 PHP-MS	-SST	6806321-204
13	5	5							6-32 x 3/8 PHP-MS	-SST	6806323-804
14	2	2							#6 FW-SST		6606000-000
15	2	2							STANDOFF		4100092
16	1	1							RESISTOR		0600006
17	1	1					2600237		HARNESS		2600237-001
01	AR	AR							WIRE, 14GA "E" TEFLON		1500380
									STD. WIRE & CABLE		
02	AR	AR							WIRE, 20GA "E" TEFLON		1500389
									STD. WIRE & CABLE		
03	3	3							LUG, 18-14 TAB FIT	AMP 42332-2	1500063

JOB QTY	ALL	QTY REC	FAB CD	PURCHASING P.O. NO	QTY DUE	REC'D	MANUFACTURE ACT HRS	EST ACT COM	COM	PLATE/PAINT IN	OUT	AREA

NOTES:

1648696
P/L

PL 1648696 REV ____ SHT 4 OF 8

DESCRIPTION DIGITEMP CONTROLLER 208/240V

NEXT ASSY END ITEM BY PAH CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF.

JOB NO. ____ S.O NO. ____

QTY ____ PROM DATE ____ ACT ____

RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.	JOB QTY	ALL	QTY REC	FAB CD	PURCHASING PO NO	QTY	DUE	REC	MANUFACTURE ACT STD	EST ACT HPS	COM	COM	PLATE/PAINT IN	OUT	AREA
04	6	6							LUG - SPADE LIGHT CRIMP		1500064															
									AMP # 42452-2																	
05	6	6							LUG 22-16 FLANGE SP. TOUNGE, AMP																	
06	AR	AR							TIEKORD, VINYL, MAYNORD MOORE		1500152															
00																										
00																										
00																										
18	AR	AR							WIRE - 20GA		1500389															
19	8	8							TIE CORD		1501379															
20	6	6							LUG		1500047															
21	5	5							LUG		1500055															
22	AR	AR							WIRE, 18 GA		1500388															
23	AR	AR							WIRE		1500409															
24																										
25	2	2							TERMINAL BOARD		1400520															
26	2	2							SWITCH		1400181															
27	1	1							SWITCH		1400189															
28	1	1							SWITCH		1400157															
29	1	1							DIGISWITCH		1400197															
30	1	1							LENS		1400090															
31	1	1							LENS		1400091															
32	1	1							LENS		1400092															
33	3	3							LAMP		1400084															
34	3	3							HOLDER - LAMP		1400076															
35	1	1							KNOB		1500279															
36	7	7							6-32 x 1/4 PHP-MS-	SST	6806321-404															
37	2	2							6-32 x 5/8 PHP-MS-	SST	6806325-804															
38	4	4							4-40 x 1/4 PHP-MS-	SST	6804401-404															
39	4	4							4-40 HN-SST		6704400-000															
40	4	4							4-40 x 1/2 FBH-MS-SST		6804401-201															
41	3	3							#6 LWS-SST		6606010-000															
42	4	4							#4 FW-SST		6604000-000															
43	4	4							#4 LWS-SST		6604010-000															

NOTES:

1648696
P/L

P.L. 1648696 REV ____ SHT 5 OF 8

DESCRIPTION DIGITEMP CONTROLLER 208/240V

NEXT ASSY END ITEM BY ____ CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF

JOB NO. ____ S.O NO ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____ ____ ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.
44	1	1				C	2637594		PC BOARD ASSY TYPE III CONTROLLER		2637594-001
01	1	1				D	1605624		PC BRD DRILL, CONTROLLER TYPE III		1605624-101
02	1	1							CAPACITOR C2 50	uf/50V	0704700-050
03	2	2							CAPACITOR C5, C13,	220 uf/12V	0722000-012
04	4	4							CAPACITOR C3, C4, C10,	C11, 10uf/25V	0701000-025
05	2	2							CAPACITOR C8, C12, 50	uf/25V	0704700-025
06	3	3							CAPACITOR C6, C7, C9,	.01uf/600V	0700120-600
07	1	1							CAPACITOR C1, 250 u	f/50V	0725000-050
08	3	3							RESISTOR R14, R43, R	55, 15K 5% 1/2W	0301530-500
09	2	2							RESISTOR R36, R40 3.	3K 5% 1/2W	0303320-500
10	2	2							RESISTOR R59, R64 8.	2K 5% 3W	0600005
11	1	1							RESISTOR R49, 12K 5	% 1/2W	0301230-500
12	3	3							RESISTOR R1, R26, R28	,680Ω 5% 1/2W	0368000-500
13	1	1							RESISTOR R5, 560 Ω	5% 1/2W	0356000-500
14	2	2							RESISTOR R62, R63, 2	70Ω 5% 1/2W	0327000-500
15	2	2							RESISTOR R60, R61, 1	00Ω 5% 1/2W	0310000-500
16	1	1							RESISTOR R39, 47Ω 5	% 1/2W	0304700-500
17	2	2							RESISTOR R46, R47 5.	6K 5% 1/2W	0305620-500
18	1	1							RESISTOR R30, 1.5K	5% 1/2W	0301520-500
19	1	1							RESISTOR R9 600Ω 1%	WIREWOUND 1/4W	0400022
20	4	4							DIODE CR 25 THRU C	R28 1N5551	1105551
21	1	1							RESISTOR R32 530Ω 1%	WIREWOUND 1/4W	0400021
22	5	5							RESISTOR R4, 5, 21, 31,	48 1K 5% 1/2W	0300130-500
23	5	5							RESISTOR R10, 15, 20, 45,	50 1.2K 5% 1/2W	0301220-500
24	3	3							RESISTOR R7, R12, R27	2.2K 5% 1/2W	0302220-500
25	11	11							RESISTOR R8, 16, 22-25	, 44, 53, 54, 55,	
									56, 59 4.7K 5%	1/2W	0304720-500
26	2	2							RESISTOR R37, R38	6.8K 5% 1/2W	0306820-500
27	4	4							RESISTOR R17-19, R57	10K 5% 1/2W	0301030-500
28	2	2							RESISTOR R42, R52 27	K 5% 1/2W	0302730-500
29	1	1							DIODE CR1, N4004		1104004
30	13	13							DIODE CR3, 4, 7, 9-17	, 24 1N4002	1104002
31	1	1							DIODE CR2	1N3028	1100022

JOB QTY	ALL	QTY REC	FAB CD	PURCHASING P.O. NO	QTY	DUE	REC	MANUFACTURE ACT STD	EST HRS	ACT COM	COM	PLATE/PAINT IN	OUT	AREA

NOTES:

P/L 1648696

P.L. 1648696 REV ____ SHT 6 OF 8

DESCRIPTION DIGITEMP CONTROLLER 208/240V

NEXT ASSY END ITEM BY LAH CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF.

JOB NO. ____ S.O. NO ____

QTY ____ PROM DATE ____ ACT ____

RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.	JOB QTY	ALL	QTY REC	FAB CD	PURCHASING P.O. NO	QTY DUE	REC	MANUFACTURE ACT	EST ACT	STD HRS	COM	COM	PLATE/PAINT IN	OUT	AREA
32	1	1							DIODE CR6	IN706	1100706															
33	2	2							DIODE CR5, CR23	IN702	1100702															
34	4	4							TRANSISTOR Q6, 12, 16, 23	2N3638	1203638															
35	14	14							TRANSISTOR Q3-5, 7-9, 13-15, 18-22	2N3565	1203565															
36	4	4							TRANSISTOR Q2, 10, 11, 17	2N1302	1201302															
37	1	1							TRANSISTOR Q1	2N1535	1201535															
38	8	8							TRANSISTOR PAD		1500301															
39	1	1							RESISTOR 820 OHM	5% 1/2W	0382000-500															
40	1								~~SWITCH (SCR)~~		~~1400552~~															
41	3	3							RELAY K1-K3	E.A.C. 121AXA1KOF	1400216															
42	21	21							TERMINAL POST		1400550															
43	1	1							SLEEVING		1500105															
44	2	2							6-32 x 3/8 PHP-MS-	SST	6806323-804															
45	2	2							4-40 x 3/4 PHP-MS-	SST	6804403-404															
46	2	2							4-40 x 3/8 PHP-MS	-SST	6804403-804															
47	2	2							6-32 HN-SST		6706320															
48	2	2							#6 FW-SST		6606010															
49	6	6							4-40 HN-SST		6704400															
50	2	2							#4 WASHER		6704010															
51	1	1							POTENTIOMETER 20	Ω 20TURN WIREWOUND	0500038															
52	1	1							POTENTIOMETER 100	Ω 20TURN WIREWOUND	0500037															
53	1	1				A	1600260		COVER, ANTICIPATOR		1600260															
54	1								~~BRACKET~~		~~1609466~~															
55	4	4							#6 FW-FIBER		6606008															
56	4	4							TERMINAL POST		1400500															
57	1	1							RESISTOR R65 905.5 Ω .05%		0400008															
58	REF	REF							F.A. RESISTOR R29		0400018, 19 OR 20															
59	REF	REF							F.A. RESISTORS R3, R6, R35 & R41 CARBON 1/4 W 5%																	
60	1	1				3	1643414		BRACKET-SCR SWITCH ASSY		1643414-101															

NOTES:

1648696
P/L

P.L. 1648696 REV ____ SHT 7 OF 8

DESCRIPTION DIGITEMP CONTROLLER 208/240V

NEXT ASSY END ITEM BY ____ CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD
SAN DIEGO, CALIF

JOB NO ____ S.O NO ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.
45	1	1			C	2635445		TRIAC ASSY 120/240 VOLT		2635445-001
00	REF	REF			C	1635446		SCHEMATIC 120/240 VOLT TRIAC		
00	REF	REF			B	1635443		ARTWORK 120/240 VOLT TRIAC		
00										
00										
01	1	1			C	1635444		P.C. BOARD 120/240 VOLT TRIAC		1635444-101
02										
03	1	1						INTEGRATED CIRCUIT #1	RCA CA3079	1000026
04										
05	1	1						TRIAC Q1	RCA T4706B ⚠1	124706
06	1	1						TRANSISTOR Q2	2N3565	1203565
07	1	1						CAPACITOR 100 uf 12V C1 SPRIGUE		0510147-051
08	3	3						DIODE CR1, CR2, CR3	IN4004	1104004
09										
10	1	1						RESISTOR, 1.2K, 1/4W, 5% R1		4045000-122
11	1	1						RESISTOR, 8.2K, 1/4W, 5% R2		4045000-822
12	1	1						RESISTOR, 4.7K, 1/4W, 5% R3		4045000-472
13	2	2						RESISTOR, 10K, 2W 5% R4, R5		0310032-103
14										
15	1	1						SOCKET, I/C 14 PIN		1710283-001
16	1	1			B	1603051		HEAT SINK		1500351
17										
18	2	2						6-32 X 1/2 PHP-MS-SST		6806321-204
19	2	2						#6 LWT-SST		6606020
20	2	2						6-32 HN-SST		6706320
21	2	2						STANDOFF, HEAT SINK		1500329

PURCHASING P.O NO	QTY DUE REC	MANUFACTURE STD HRS	ACT EST ACT COM COM	PLATE/PAINT IN	PLATE/PAINT OUT	AREA

NOTES:

⚠1 RCA 40716 MAY BE SUBSTITUTED FOR ITEM 5.

P/L 1648696

P.L. 1648696 REV ____ SHT 8 OF 8

DESCRIPTION DIGITEMP CONTROLLER 208/240V

NEXT ASSY END ITEM BY ____ CK'D ____ APPD ____

REV	ECN	DATE	BY	APP

DELTA DESIGN
5725 KEARNY VILLA RD.
SAN DIEGO, CALIF

JOB NO. ____ S.O. NO ____
QTY ____ PROM DATE ____ ACT ____
RUN * ____ MACH ____

ITEM NO	ASSY & QTY -001	-002	-003	-004	INDENTURE	SIZE	DRAWING NO.	REV	DESCRIPTION	MFG OR MFG NO.	STOCK OR PART NO.
46	1	1				D	2631505		CHASSIS ASSY		2631505-001
00	REF	REF				D	1600261		CENTER BRACKET		1600261-101
00	REF	REF				D	1631550		FRONT PANEL		1631550-101
00	REF	REF				D	1605598		MOUNTING DIMENSIONS,	CONTROLLER	
00											
00											
01											
02	1	1				D	2631505		CHASSIS FRAME, .062	THK x 4 3/4 x 23 5/16	2631505-101
									FINEBARK AL ALY 3003-	H14 COND 1/2 HARD	
03	4	4				D	2631505		GUSSET, .062 THK x 1 7/8	x 1 7/8 FINEBARK	2631505-102
									AL ALY 3003-H14 COND	1/2 HARD	
04	8	8							POP RIVET, AL ALY, USM	# AD42ABS	1700051
									1/8 DIA x 1/8 GRIP		
05	5	5							#6-32 SWAGE NUT		1700029

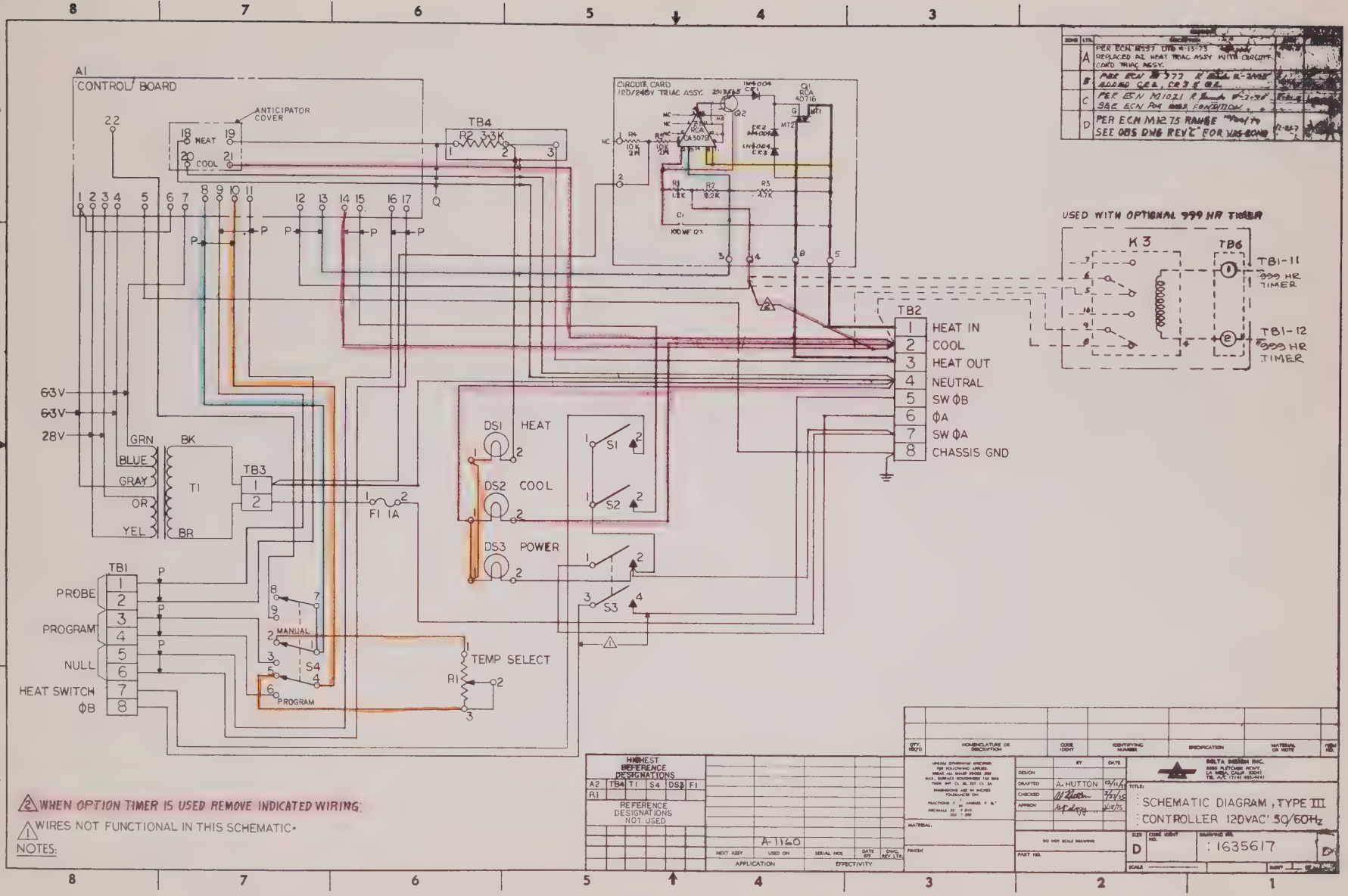
JOB QTY	ALL	QTY REC	FAB CD	PURCHASING P.O. NO	QTY	DUE	REC	MANUFACTURE ACT EST ACT STD	HRS	COM	COM	PLATE/PAINT IN	OUT	AREA

NOTES:

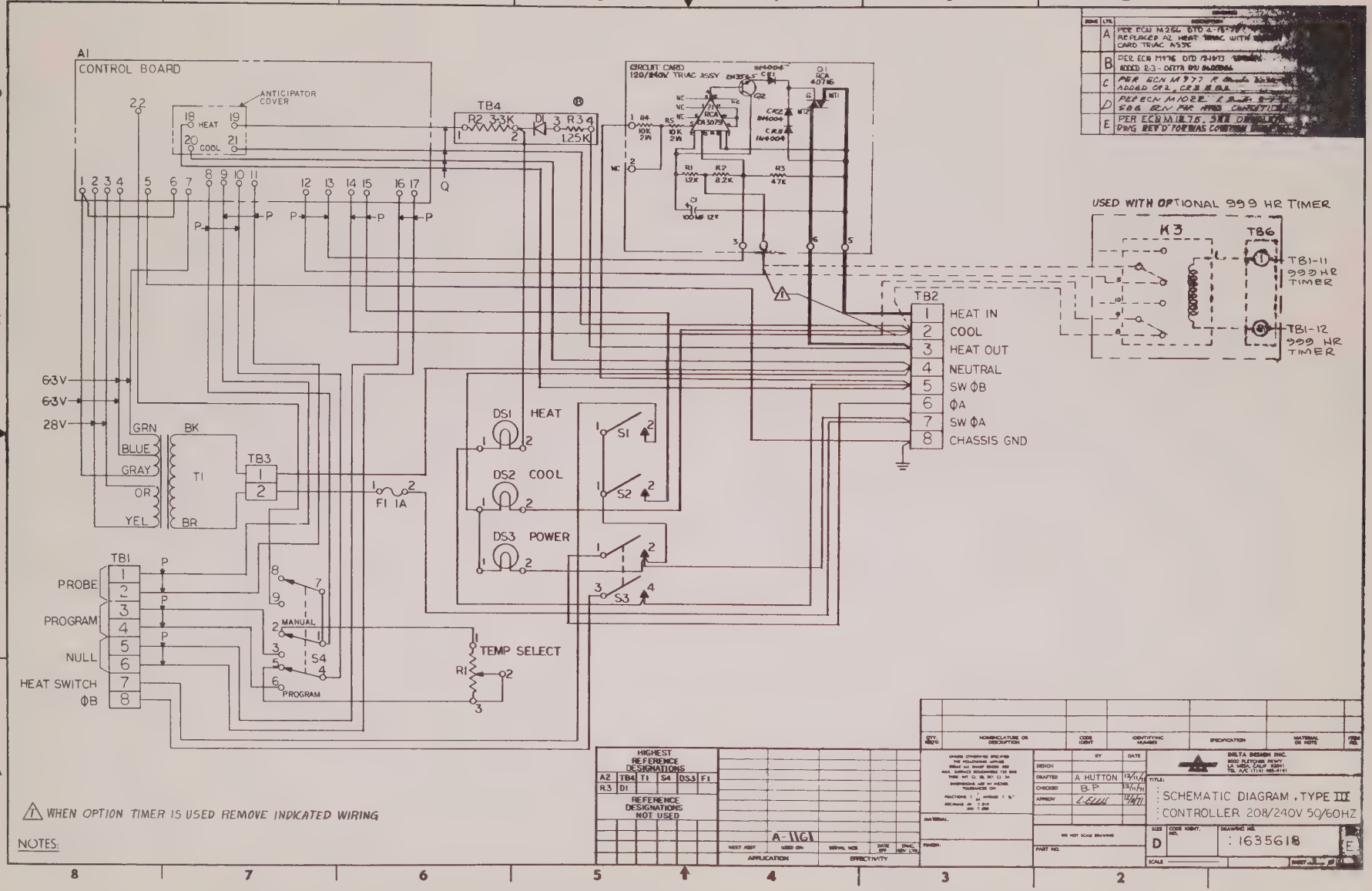
1648696
P/L

CONTROLLER OPTION
PARTS LIST

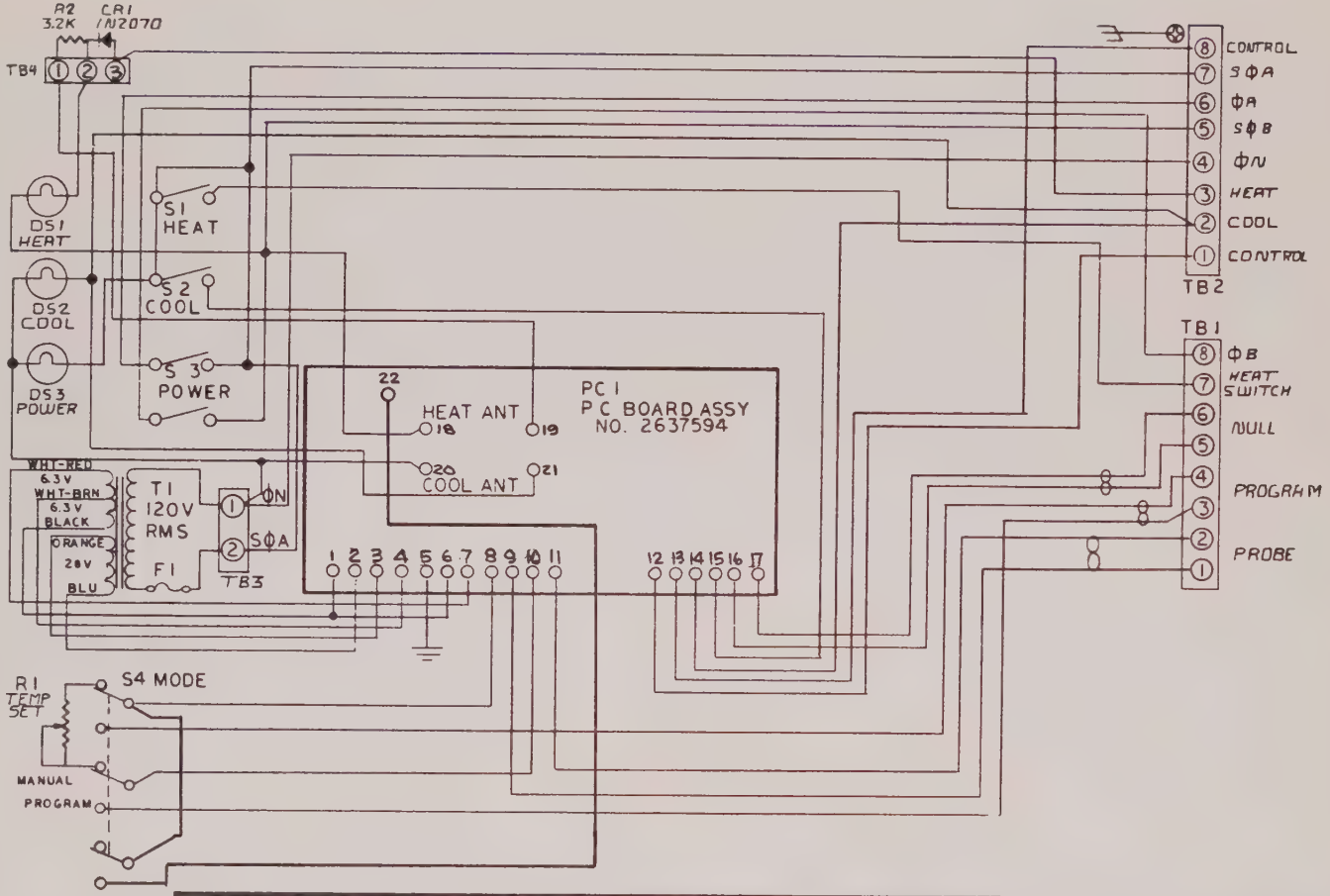
Controller Model	Temperature Range	Scale	Potentiometer	Delta P/N	R29 Value	Delta P/N
A1160-1	-100 to +600	°F	D-12	0500034	118	0400020
A1160-3	-73 to +315	°C	D-11	0500018	118	0400020
A1160-5	-300 to +600	°F	D-16	0500013	26	0400018
A1160-11	-184 to +315	°C	D-24	0500015	26	0400018
A1160-17	-100 to +350	°F	D-48	0500011	118	0400020
A1160-19	-73 to +177	°C	D-42	0500033	118	0400020



ZONE	LTR	
	A	PER ECN M1237 DTD 4-13-73 REPLACED A2 HEAT TRIAC ASSY WITH CIRCUIT CARD TRIAC ASSY.
	B	PER ECN M1377 R2 CHG TO 8.2K ADDED Q2, CR3 & C1.
	C	PER ECN M1021 R1 CHG TO 10K 2W SEE ECN FOR OTHER CONDITION.
	D	PER ECN M1215 RANGE CHG TO SEE OBS DWG REV E FOR WAS-ZONE


A1
CONTROL BOARD
ANTICIPATOR COVER
HEAT
COOL
TB4
R2 3.3K
R3 1.25K
CIRCUIT CARD
120/240V TRIAC ASSY
USED WITH OPTIONAL 999 HR TIMER
K3
TB6
TB1-11 999 HR TIMER
TB1-12 999 HR TIMER
TB2
1 HEAT IN
2 COOL
3 HEAT OUT
4 NEUTRAL
5 SW ΦB
6 ΦA
7 SW ΦA
8 CHASSIS GND
63V
63V
28V
GRN
BK
BLUE
GRAY
OR
YEL
BR
T1
TB3
F1 1A
DS1 HEAT
DS2 COOL
DS3 POWER
S1
S2
S3
TB1
PROBE
PROGRAM
NULL
HEAT SWITCH
ΦB
MANUAL
S4
PROGRAM
TEMP SELECT
R1
⚠ WHEN OPTION TIMER IS USED REMOVE INDICATED WIRING
NOTES:
HIGHEST REFERENCE DESIGNATIONS
A2 TB4 T1 S4 DS3 F1
R3 D1
REFERENCE DESIGNATIONS NOT USED
A-1161
APPLICATION
EFFECTIVITY
DELTA DESIGN INC.
TITLE:
SCHEMATIC DIAGRAM, TYPE III
CONTROLLER 208/240V 50/60HZ
DRAWING NO. 1635618
SIZE D
SCALE
DRAFTED A HUTTON 12/11/71
CHECKED B.P 12/11/71
APPROV L.ELLIS 12/11/71

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD



REF			A 1172				
DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV	
APPLICATION				EFFECTIVITY			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES, ON
DECIMALS: .XX ± .03; .XXX ± .010
ANGLES: 0° 30'
HOLE TOLERANCES

MATERIAL ⚠
FINISH ⚠

⚠ FINISH (IF APPLICABLE)
⚠ MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

ENGINEERING ACTIVITY	
ECN M 1024	
DESIGN	
DRAFTED	RWILLIAMS 5-23-73
CHECKED	
APPROV	G. COLOPY 8-21-5
RELEASE	
DO NOT SCALE DWG	

DELTA DESIGN INC.
A SUBSIDIARY OF COMU INC.
8725 KEARNY VILLA RD SAN DIEGO, CA. 92123 - TEL (714) 292-8000

TITLE:
SCHEMATIC DIAGRAM
A1172-7650 CONTROLLER

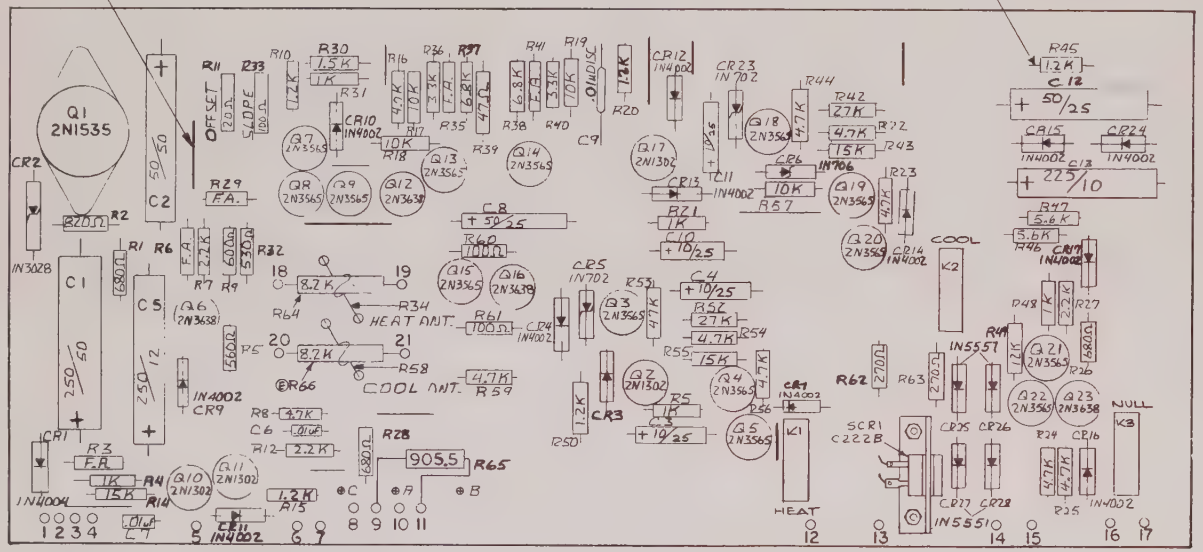
SIZE	CODE IDENT	
C		1643351
SCALE		SHEET ___ OF ___

B-SHOP GRAPHICS/ACCUPRESS
REORDER NO. 2133

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	A	PER ECN M-232 DATED 3-26-73 BY MORSE. ADDED NOTE 3: R3, R35 AND R41 TO BE 1/4 W.	3-26-73 MORSE	
	B	PER ECN M308 DATED 4-27-73 BY W. AMS ADD TO NOTE 3: R20 R32 TO BE 1/4 W	4-27-73	Wms
	C	PER ECN M788. AHMED 8-2-74	8-2-74	K Ahmed
	D	PER ECN M910 AHMED 10-10-74	10/10/74	K Ahmed
	E	PER ECN M923 AHMED 10-24-74	10/29/74	K Ahmed
	F	PER ECN M977 R Brown 2-24-75 SEE ECN FOR WAS CONDITION	2/27/75	K Ahmed
	G	PER ECN M1023 R Brown 3-7-75 SEE ECN FOR WAS CONDITION	3-12-75	K Ahmed
	H	PER ECN 1218 G Jackson 6/15/77 CHG'D K1,K2,K3 TO PRESET CONFIG.	6-15-77	

CONNECTION POINT NO. 22 (BUS WIRE JUMPER)

ATTACH SCOPE HERE TO MONITOR NULL. CONNECT SCOPE GND TO CHASSIS GND.



			1140								
			1122								
			1778								
			1172								
			1161								
			1160								
DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.		DATE EFF	DWG REV				
APPLICATION				EFFECTIVITY							

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ± .03 .XXX ± .010 ANGLES 0°30'

HOLE TOLERANCES

.013 THRU .125	+.004 −.001	.251 THRU .500	+.004 −.001
.126 THRU .250	+.003 −.001	.501 THRU .750	+.008 −.001

MATERIAL ⚠1

FINISH ⚠2

ENGINEERING ACTIVITY

DESIGN	J.C
DRAFTED	R. WMS 3-5-73
CHECKED	V Kuttan
APPROV	Wms 4-17-73
RELEASE	R Brown 3/27/74
DO NOT SCALE DWG	

DELTA DESIGN INC.
A SUBSIDIARY OF CONTU INC.
5725 KEARNY VILLA RD SAN DIEGO, CA. 92123 - TEL (714) 292-5000

TITLE: PC ASSEMBLY TYPE III CONTROLLER

SIZE	CODE IDENT		
C		2637594	H

SCALE NONE SHEET 1 OF 1

⚠3 RESISTORS DESIGNATED BY "F.A" ARE FACTORY ADJUST RESISTORS.

⚠1 FINISH (IF APPLICABLE)

⚠2 MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

BLUE CARD

FORM 4-17-72

DELTA DESIGN, INC.
5725 KEARNY VILLA RD
SAN DIEGO, CA. 92123
TEL. (714) 292-5000

NOTES:

ITEM	QTY	DRAWING NUMBER	DESCRIPTION	MANUFACT AND NO.	STK OR PART NO.	FAB CODE
00	1	C2637594	P.C. BOARD ASSY		2637594	17
01	1	D1605624	P.C. BRD DRILL, CONTROLLER TYPE III		1605624	12
02	1		CAPACITOR C2 50uF/50V		0704700-050	70
03	2		CAPACITOR C5, C13, 220uF/12V		0722000-012	70
04	4		CAPACITOR C3, C4, C10, C11, 10uF/25V		0701000-025	70
05	2		CAPACITOR C8, C12, 50uF/25V		0704700-025	70
06	3		CAPACITOR C6, C7, C9 .01uF/600V		0700120-600	70
07	1		CAPACITOR C1, 250uF/50V		0725000-050	70
08	3		RESISTOR R14, R43, R55, 15K 5% 1/2W		0301530-500	70
09	2		RESISTOR R38, R40 3.3K 5% 1/2W		0303320-500	70
10	2		RESISTOR R63, R64 8.2K 5% 3W		0600005	70
11	1		RESISTOR R49, 12K 5% 1/2W		0301230-500	70
12	3		RESISTOR R1, R26, R28, 680 ohm 5% 1/2W		0368000-500	70
13	1		RESISTOR R5, 560ohm 5% 1/2 W		0356000-500	70
14	2		RESISTOR R62, R63, 270 ohm 5% 1/2W		0327000-500	70
15	2		RESISTOR R60, R61, 100 ohm 5% 1/2W		0310000-500	70
16	1		RESISTOR R39, 47 ohm 5% 1/2W		0304700-500	70
17	2		RESISTOR R46, R47 5.6K 5% 1/2W		0305620-500	70
18	1		RESISTOR R30, 1.5K 5% 1/2W		0301520-500	70
19	1		RESISTOR R9 600 ohm 1% WIREWOUND ½W		0400022	70
20	4		DIODE CR25 THRU CR28	IN5551	1105551	70
21	1		RESISTOR R32 530 ohm 1% WIREWOUND ½W		0400021	70
22	5		RESISTOR R4, 5, 21, 31, 48 1K 5% 1/2W		0300130-500	70
23	5		RESISTOR R10, 15, 20, 45, 50 1.2K 5% 1/2W		0301220-500	70
24	3		RESISTOR R7, R12, R27 2.2K 5% 1/2W		0302220-500	70
25	11		RESISTOR R8,16,22-25,44,53,54,56,59 4.7K 5% 1/2W		0304720-500	70

REVISIONS

REV	DATE	BY	APPD	DESCRIPTION
H	6-24-74	OLEJNIK		PER ECN M1218
B	6-22	WILLIAMS		CHANGED PER ECN M308
C	8-2-74	AHMED		PER ECN M 738
D	10-10-74	AHMED		PER ECN M 910
E	10/29/74	AHMED		PER ECN M 923
F	3/7/75			PER ECN M1023
G	11/19/75	D. FORREST		PER ECN M 1033

TITLE: P.C. BOARD ASSEMBLY TYPE III CONT

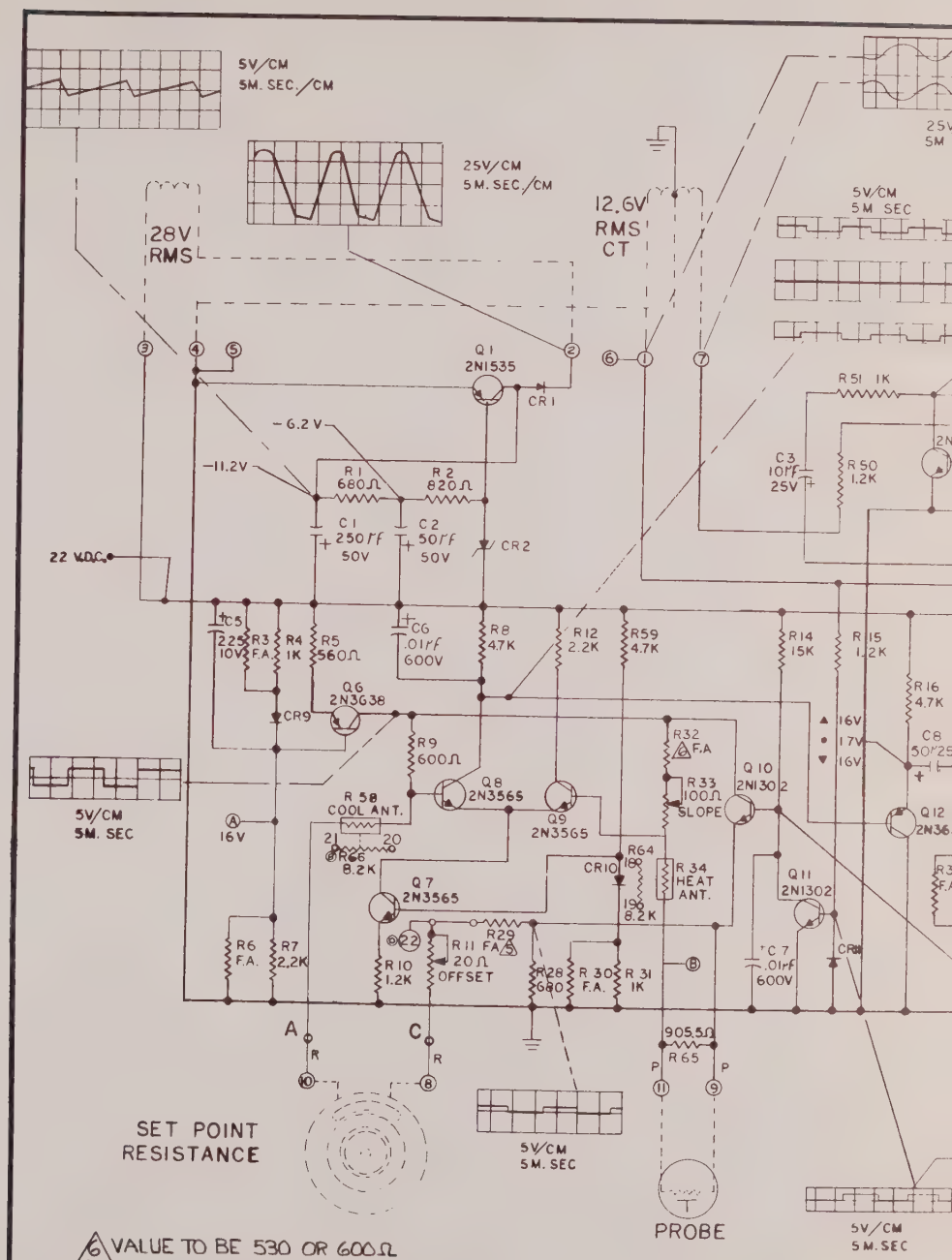
BY	R Wyse	4-15-71
CHK	Al Hutton	4-16-73
APPD		4-17-73

NEXT ASSY P/L: MULTI-USAGE

P/L 2637594 REV H SHT 1 OF 2

DELTA DESIGN, INC.	Parts List No. 2637594	Sheet 2 of 2

Item	Qty.	Drawing Number	Description	Manufacturer and Part No.	Stock No.	Fab. Code
26	2		RESISTOR R37, R38 6.8K 5% 1/2W		0306820-500	70
27	4		RESISTOR R17-19, R57 10K 5% 1/2W		0301030-500	70
28	2		RESISTOR R42, R52 27K 5% 1/2W		0302730-500	70
29	1		DIODE CR1, N4004		1104004	70
30	13		DIODE CR3, 4, 7, 9-17, 24 1N4002		1104002	70
31	1		DIODE CR2 1N3028		1100022	70
32	1		DIODE CR6 1N706		1100706	70
33	2		DIODE CR5, CR23 1N702		1100702	70
34	4		TRANSISTOR Q6, 12, 16, 23 2N3638		1203638	70
35	14		TRANSISTOR Q3-5, 7-9, 13-15, 18-22 2N3565		1203565	70
36	4		TRANSISTOR Q2, 10, 11, 17 2N1302		1201302	70
37	1		TRANSISTOR Q1 2N1535		1201535	70
38	8		TRANSISTOR PAD		1500301	90
39	1		RESISTOR 820 ohm 5% 1/2W		0382000-500	70
~~40~~	~~1~~		~~SWITCH (SCR)~~		~~1400552~~	~~70~~
41	3		RELAY K1-K3	EAC 121AXA1KOF	~~1400211~~ 1400216	
42	21		TERMINAL POST		1400550	70
43	1		SLEEVING		1500105	90
44	2		SCREW 6-32 X 3/8		6806323-824	90
45	2		SCREW 4-40 X 3/4		6804403-424	90
46	2		SCREW 4-40 X 3/8		6804403-824	90
47	2		NUT 6-32		6706320	90
48	2		WASHER #6		6606010	90
49	6		NUT 4-40		6704400	90
50	2		WASHER #4		6704010	90
51	1		POTENTIOMETER 20 ohm 20 TURN WIREWOUND		0500038	70
52	1		POTENTIOMETER 100 ohm 20 TURN WIREWOUND		0500037	70
53	1	A1600260	COVER ANTICIPATOR		1600260	20
~~54~~	~~1~~		~~BRACKET~~		~~1600466~~	~~20~~
55	4		WASHER-FIBER, #6 FLAT		6604008	90
56	4		TERMINAL POST		1400500	70
57	1		RESISTOR R65 905.5 ohm .05%		0400008	70
58	REF		F.A. RESISTOR R29		0400018, 19 or 20	
59	REF		F.A. RESISTORS R3, R6, R35 & R41-CARBON ½W-5%			
60	1	B1643414-001	BRACKET- SCR SWITCH ASS'Y		1643419-001	

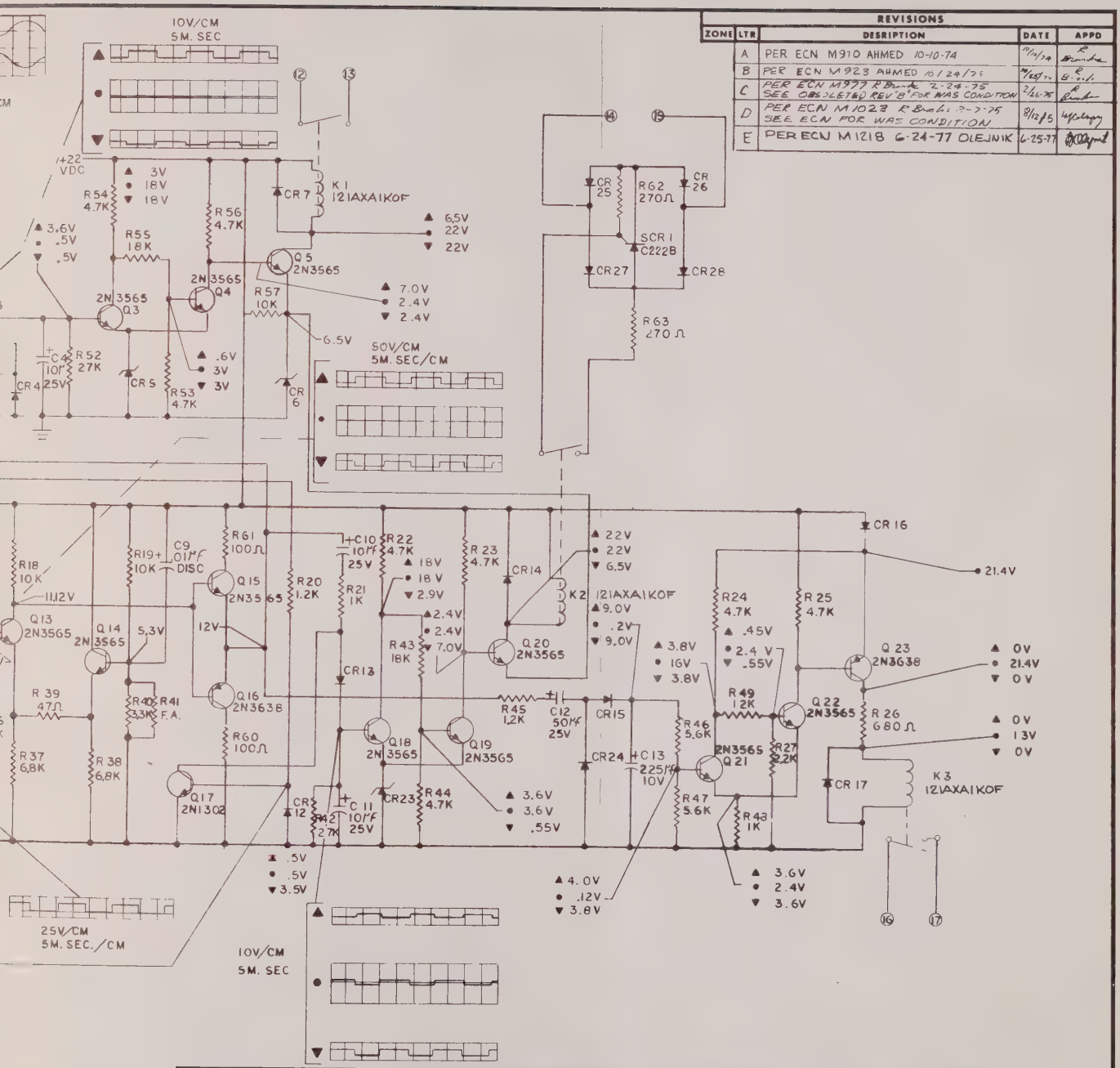


6 VALUE TO BE 530 OR 600Ω

5 VALUE TO BE 118, 107 OR 26Ω

4. ALL VOLTAGES ARE D.C. MEASURED FROM CHASSIS GROUND
3. ▲ SET POINT CONTROL, 10°F HIGHER THAN NULL
2. ● SET POINT CONTROL, SET AT NULL
1. ▼ SET POINT CONTROL, 10°F LOWER THAN NULL

NOTES: UNLESS OTHERWISE SPECIFIED



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	A	PER ECN M910 AHMED 10-10-74	10/10/74	R Brandon
	B	PER ECN M923 AHMED 10/29/74	11/25/74	G.R.
	C	PER ECN M977 R Brandt 2-24-75 SEE OBSOLETED REV 'B' FOR WAS CONDITION	2/26/75	R Brandt
	D	PER ECN M1023 R Brandt 8-7-75 SEE ECN FOR WAS CONDITION	8/12/75	Upddagy
	E	PER ECN M1218 6-24-77 OLEJNIK	6-25-77	

		REF D2637594	MULTI USAGE						
DASH QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV	MATERIAL			
APPLICATION			EFFECTIVITY			FINISH			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ± .03, .XXX ± .010
ANGLES: 0° 30'
MOLD TOLERANCES

ENGINEERING ACTIVITY

DESIGN		
DRAFTED	R. WMS	3-5-73
CHECKED		3/29/75
APPROV		2/28/75
RELEASE	R Brandt	2/26-75
DO NOT SCALE DWG		

DELTA DESIGN INC.
A SUBSIDIARY OF CONSU INC.
5725 KEARNY VILLA RD SAN DIEGO, CA. 92123 - TEL (714) 292-2000

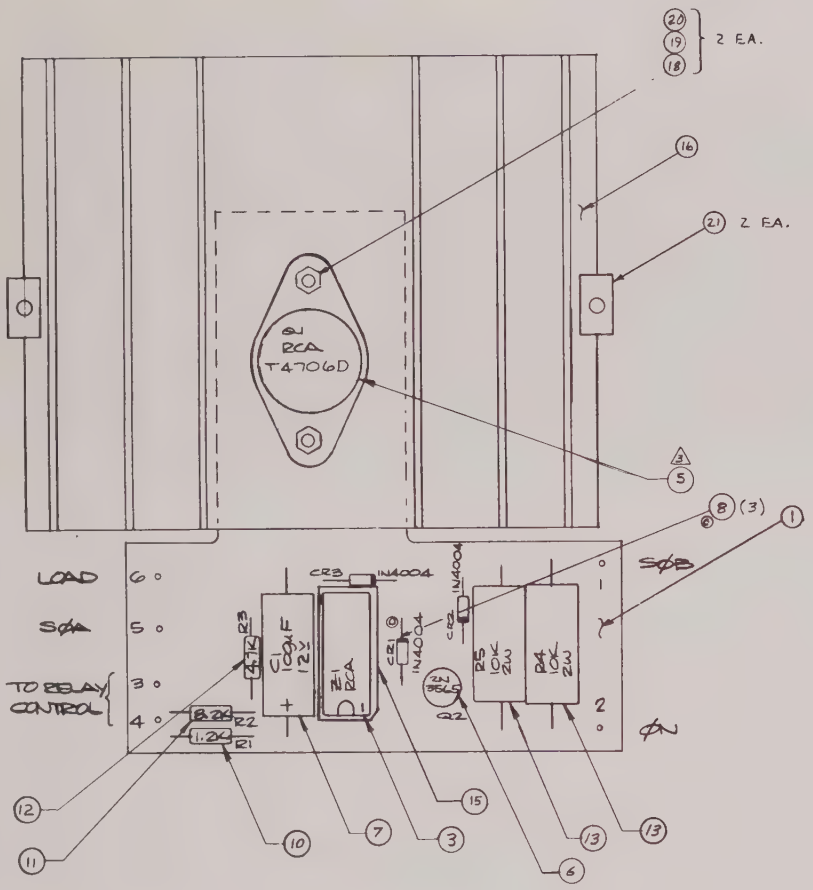
TITLE: SCHEMATIC DIAGRAM, CONTROL BD-TYPE III CONTROLLER

SIZE	CODE IDENT	
D		1635619

SCALE NONE — SHEET ___ OF ___

BLUE CARD

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	ADDED ITEM NO PER ECN M030	10-11-72	L. ELLIS 10-27-72
	B	ADDED ITEM 10. PER ECN M061 Harris 11-9-72	11-9-72	L. ELLIS
	C	PER ECN M191 R Brooks 3-7-73 ADDED CR1, ITEM 11	3-24-73	A Desai
	D	PER ECN M385 DTD 9/24/73 FJO ADDED CR2 (1N4004)	9/24/73	A. Desai
	E	PER ECN M617 DATED 4/18/74 - GKT ADDED Q2(2N3565), CR3 (1N4004), Q1 WAS 40716	4/18/74	
	F	PER ECN M739 R Brooks 6-21-74 SEE ECN FOR CHANGE		M.B. 6-28-74



P/L "A" SIZE

QTY REQ'D	NOMENCLATURE OR DESCRIPTION	CODE IDENT	IDENTIFYING NUMBER	SPECIFICATION	MATERIAL OR NOTE	ITEM NO

1.) ENG REF: 15 AMPS RESISTIVE MAX. CURRENT RMS

2.) SCHEMATIC REF: C1635446

3. RCA 40716 IS A SUBSTITUTABLE PART FOR ITEM 5 RCA T4706D

NOTES:

MULTI. USAGE				
—	A1161	TYPE III 140V		
—	A1160	TYPE III 120V		
NEXT ASSY	USED ON	SERIAL NOS	DATE EFF	DWG. REV. LTR.
APPLICATION		EFFECTIVITY		

UNLESS OTHERWISE SPECIFIED THE FOLLOWING APPLIES
BREAK ALL SHARP EDGES .005
MAX. SURFACE ROUGHNESS 125 RMS
THDS INT. CL 2B, EXT CL 2A
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 ANGLES ± ½°
DECIMALS .XX ± .010
.XXX ± .005

MATERIAL ~

FINISH ~

	BY	DATE
DESIGN	M. MUSTYLER	2-16-72
DRAFTED	M. MUSTYLER	2-16-72
CHECKED	[illegible]	5-1-72
APPROV	L. ELLIS	10-10-72

DO NOT SCALE DRAWING

PART NO 2635445

DELTA DESIGN INC.
8000 FLETCHER PKWY.
LA MESA, CALIF 92041
TEL A/C (714) 465-4141

TITLE: 120/240V TRIAC ASS'Y

SIZE	CODE IDENT NO	DRAWING NO	REV LTR
C		2635445	F

SCALE 2:1 SHEET 1 OF 1

BLUE CARD

RM 4-17-72

DELTA DESIGN, INC.
5725 KEARNY VILLA RD
SAN DIEGO, CA. 92123
TEL. (714) 292-5000

NOTES: 1. RCA 40716 MAY BY SUBSTITUTED FOR Q5

REF. USED ON A1160 AND A1161 CONTROLLERS

ITEM	QTY	DRAWING NUMBER	DESCRIPTION	MANUFACT AND NO.	STK OR PART NO.	FAB CODE
00	1	C2635445	ASSY 120/240 VAC TRIAC	DELTA DESIGN	2635445	17
00	REF	C1635446	SCHEMATIC 120/240 VAC TRIAC	DELTA DESIGN	1635446	
00	REF	B1635443	ARTOWORK 120/240 VAC TRIAC	DELTA DESIGN	1635443	
01	1	C1635444	P.C. BOARD 120/240 VAC TRIAC	DELTA DESIGN	1635444	12
02						
03	1		INTEGRATED CIRCUIT Z1	RCA CA3079	1000026	70
04						
05	1		TRIAC Q1	RCA T4706B 1.	124706	70
06	1		TRANSISTOR Q2	2N3565	1203565	70
07	1		CAPACITOR 100μF 12V C1	SPRIGUE	0510147-051	70
08	3		DIODE CR1,CR2,CR3	1N4004	1104004	70
09						
10	1		RESISTOR, 1.2K, ¼W, 5% R1		4045000-122	70
11	1		RESISTOR, 8.2K, ¼W, 5% R2		4045000-822	70
12	1		RESISTOR, 4.7K, ¼W, 5% R3		4045000-472	70
13	2		RESISTOR, 10K, 2W, 5% R4,R5		0310032-103	70
14						
15	1		SOCKET, 1/C 14 PIN		1710283-001	70
16	1	B1603051	HEAT SINK		1500351	70
17						
18	2		SCREW #6-32 x ⅜		6806321-224	90
19	2		LOCKWASHER #6		6606022	90
20	2		NUT #6-32		6706322	90
21	2		STANDOFF, HEAT SINK		1500329	90
22						

REVISIONS

REV	DATE	BY	APPD	DESCRIPTION
F	4-18-74	GKJ		PER ECN M617 DATED 4-18-74 RETYPED, ADDED
				Q2, CR3, Q1 WAS 40716, OBSOLETED OLD P/L
G	6-20-74	R BROOKS	7/3 dl	ADDED ITEM 7 & ITEM 15 P/N WAS 2500051
				ADDED NOTE 1 PER ECN M739

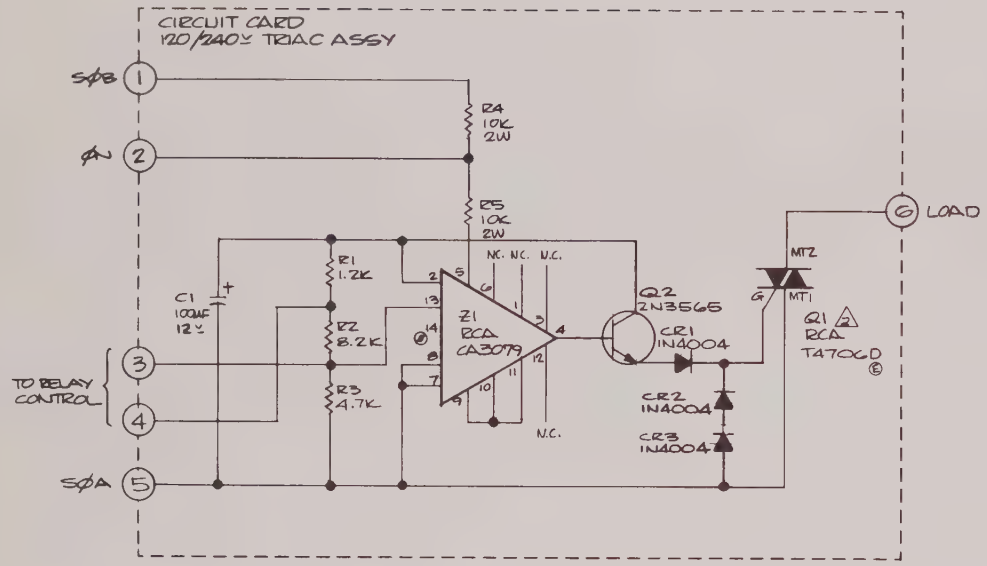
TITLE: 120/240 VAC TRIAC ASSY.

NEXT ASSY P/L: END ITEM

BY	J.D. ADAMS	10-11-72
CHK	E. HARRIS	10-26-72
APPD	L. ELLIS	10-27-72

P/L 2635445 REV G SHT 1 OF 1

REVISIONS				
ZONE	LTR.	DESCRIPTION	DATE	APPROVED
	A	ECN CHANGE PER M030	10-11-72	L. ELLIS 10-27-72
	B	PER ECN M191 R Brooks 3-7-73 ADDED CR1 (IN4004) REMOVED CONNECTION OF Z1 PIN 14 TO 13	9-24-73	A Desai
	C	PER ECN M385 DTD 9/24/73 F.J.O. ADDED CR2 (IN4004)	9/24/73	A. Desai
	D	PER ECN M617 DATED 4-18-74 - GKJ - ADDED Q2 (2N3565), CR3 (IN4004) Q1 WAS 40716	4/18/74	Kamin
	E	PER ECN M739 R Brooks 6-20-74 ADDED NOTE 2 & Q1 WAS T4706B		M. Bhatt 6-28-74



QTY. REQ'D	NOMENCLATURE OR DESCRIPTION	CODE IDENT.	IDENTIFYING NUMBER	SPECIFICATION	MATERIAL OR NOTE	ITEM NO.

⚠ RCA PART NO. 40716 IS A SUBSTITUTABLE PART FOR Q1 RCA T4706D

1. ALL RESISTORS ¼W, 5%, CARBON.

NOTES: UNLESS OTHERWISE INDICATED.

NEXT ASSY.	USED ON	SERIAL NOS.	DATE EFF	DWG. REV LTR
2635445	A1160 & A1161			

APPLICATION | EFFECTIVITY

UNLESS OTHERWISE SPECIFIED THE FOLLOWING APPLIES.
BREAK ALL SHARP EDGES .005
MAX. SURFACE ROUGHNESS 125 RMS
THDS INT. CL 2B, EXT CL 2A
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 ANGLES ± ½°
DECIMALS .XX ±.010
XXX ±.005

MATERIAL:

FINISH.

	BY	DATE
DESIGN	J.C. EST.	2-14-72
DRAFTED	M.W. TYLER	2-16-72
CHECKED	[illegible]	5-1-72
APPROV	L. ELLIS	10-10-72

DO NOT SCALE DRAWING

PART NO

DELTA DESIGN INC.
8000 FLETCHER PKWY.
LA MESA, CALIF. 92041
TEL: A/C (714) 465-4141

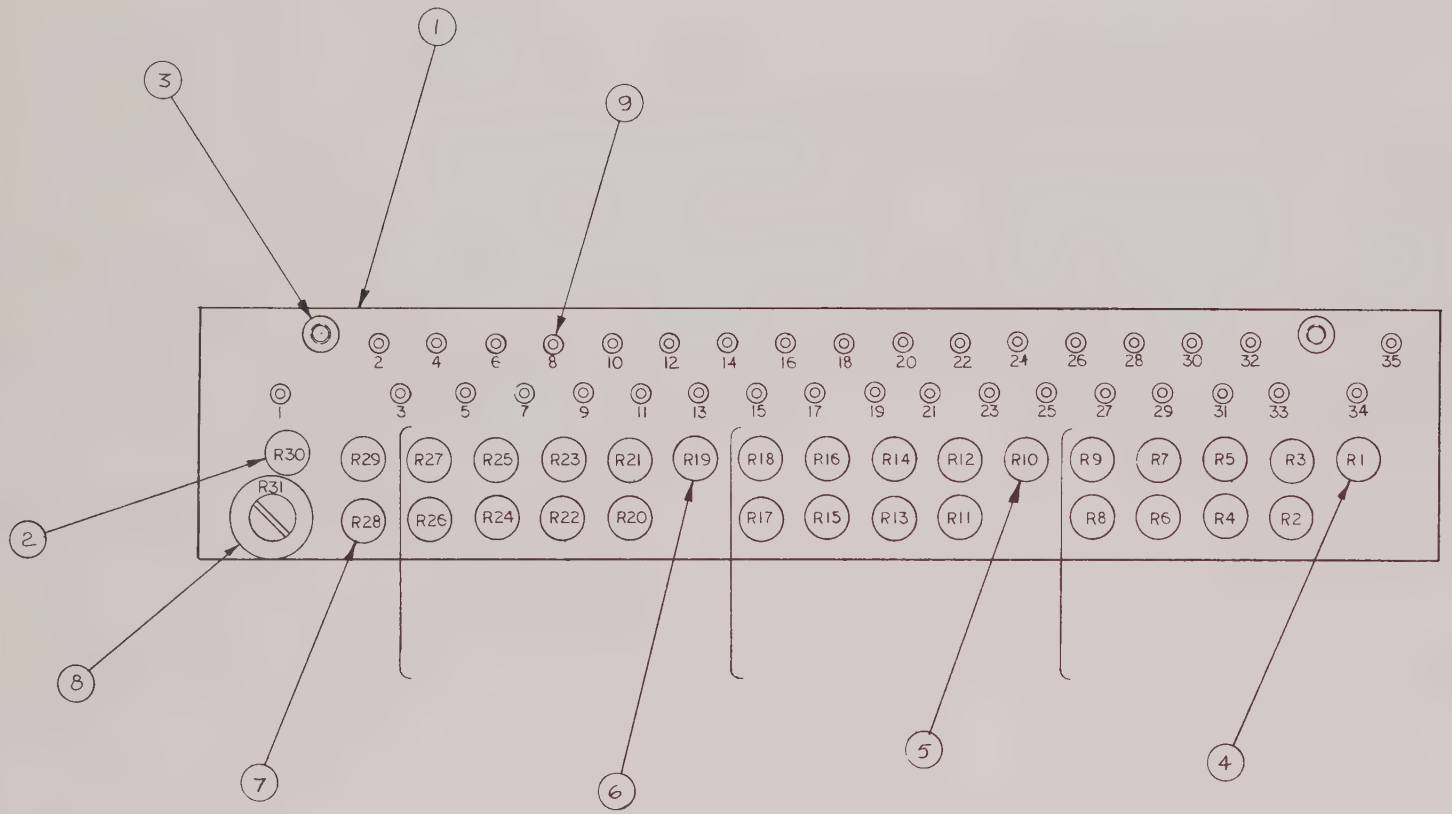
TITLE
: SCHEMATIC -
: 120/240V TRIAC

SIZE	CODE IDENT NO	DRAWING NO	REV LTR
C		C1635446	E

SCALE NONE | SHEET 1 OF 1

BLUE CARD

REVISIONS				
ZONE	LTR	DESCRIPTION	E	APPD
	D	PER ECN M428 DTD. 11-5-73 EJO. REVISED & REDRAWN SEE D2605605 REV "C" FOR WAS CONFIGURATION	11-13-73	Harris



		2631505	A1778								
DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.		DATE EFF	DWG REV				
APPLICATION				EFFECTIVITY							

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ± .03, .XXX ± .010
ANGLES: 0° 30'

HOLE TOLERANCES

.013 THRU .128	+.004 −.001	.131 THRU .500	+.006 −.001
.130 THRU .250	+.008 −.001	.501 THRU .750	+.008 −.001

MATERIAL ⚠1
FINISH ⚠2
DO NOT SCALE DWG

ENGINEERING ACTIVITY		
DESIGN	OLEJNIK	
DRAFTED	OLEJNIK 11-2 73	
CHECKED		
APPROV	Harris 11-13-73	
RELEASE		

DELTA DESIGN INC.
A SUBSIDIARY OF CONTROL INC.
SAN DIEGO, CA. 92123

TITLE: PRINTED CIRCUIT BOARD
RESISTOR DIGITEMP

SIZE	CODE IDENT		
C		2605605	D
SCALE 2/1		SHEET 1 OF 1	

⚠ FINISH (IF APPLICABLE)

⚠ MATL (IF APPLICABLE) SEE P/L

NOTES: UNLESS OTHERWISE SPECIFIED

BLUE CARD

DELTA DESIGN, INC.
5725 KEARNY VILLA RD
SAN DIEGO, CA. 92123
TEL. (714) 292-5000

NOTES:

USE ON MODEL A1778

ITEM	QTY	DRAWING NUMBER	DESCRIPTION	MANUFACT AND NO.	STK OR PART NO.	FAB CODE
00	REF	C2605605	ASSY. RESISTOR NETWORK DIGITEMP CONTROLLER		2605605	16
01	1	C1605604	DRILLING INSTRUCTIONS		1605604	
02	1		RESISTOR WIREWOUND R-30	COHU 57.65 Ω 01%	0400006	70
03	2		STANDOFF 3/8"	CAMBION 1300-12	4100096	70
04	9		RESISTOR WIREWOUND R1-R9	COHU .081 Ω 10%	0400002	70
05	9		RESISTOR WIREWOUND R10-R18	COHU .81 Ω 1%	0400003	70
06	9		RESISTOR WIREWOUND R19-R27	COHU 8.1 Ω 1%	0400004	70
07	2		RESISTOR WIREWOUND R28-R29	COHU 81 Ω .01%	0400005	70
08	1		TRIMPOT R31	BOURNS 3367 P-100	0500027	70
09	35		EYELET	E.B. STIMPSON A-2059	2010184-017	90
10	1	C1605603	ARTWORK RESISTOR BOARD P.C.		1605603	11
11	1		DIGITSWITCH ASSY. S2-S6(SEE D1639124)	DIGITRAN 3D-145B	1400197	70
12	25		WIRE 20 AWG		1500389	70
13	1	D1639124	WIRING DIAGRAM 120/240 VOLT			

REVISIONS

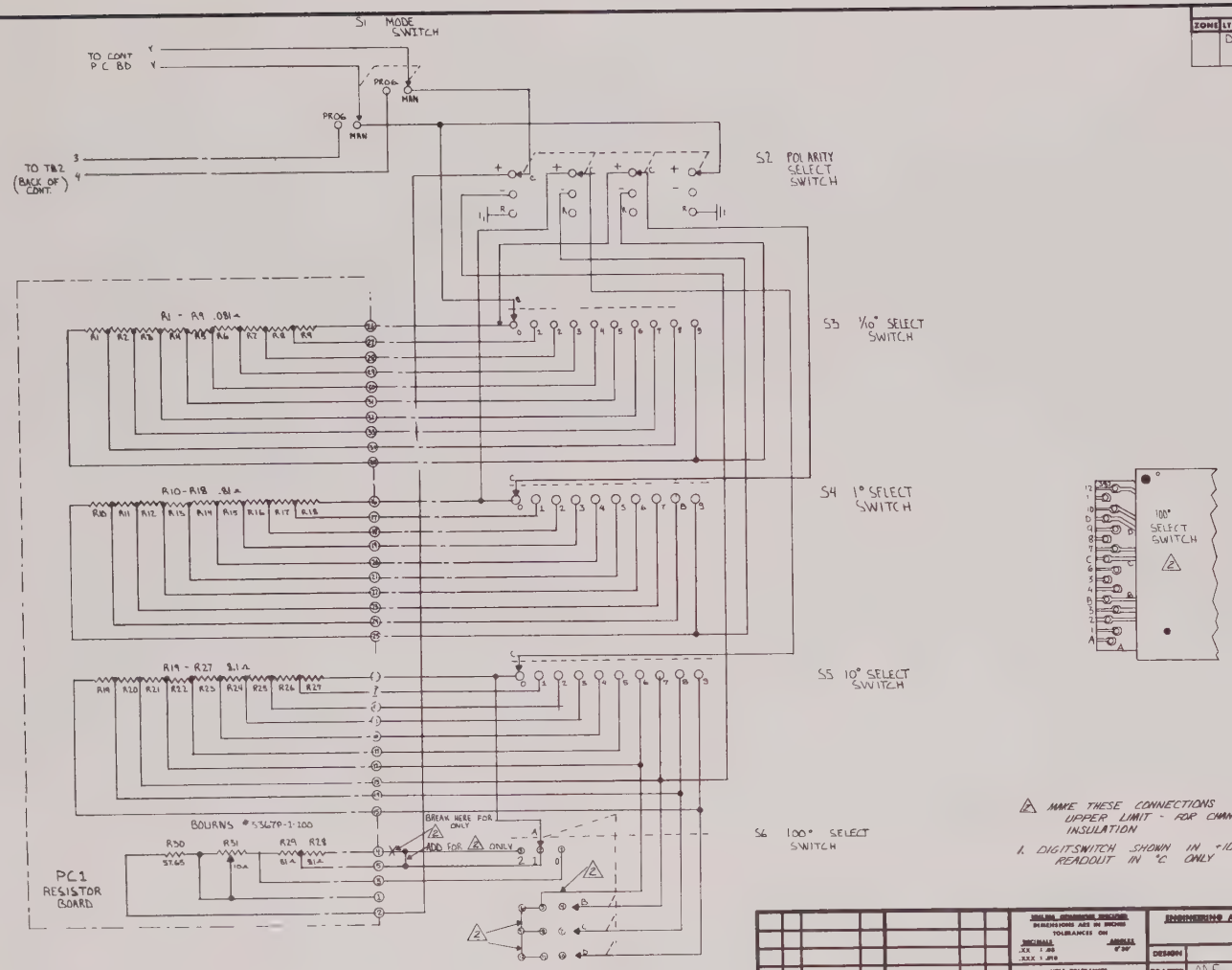
REV	DATE	BY	APPD	DESCRIPTION
A	11-5-73	FJO		PER ECN M428 F.J.O. REVISED & RETYPED

TITLE: ASSY. RESISTOR NETWORK DIGITEMP CONTROLLER

NEXT ASSY P/L: A-1778

BY	F. OLEJNIK	11-5-73
CHK		
APPD	[signature]	11-13-73

P/L 2605605 REV A SHT 1 OF 1



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	D	PER ECN M428 DTD 11-5-73 J.R REDRAWN. SEE D2605G05 REV 'C' FOR WAS CONDITION	11-13-73	Harris

⚠2 MAKE THESE CONNECTIONS FOR 149.9 °C UPPER LIMIT - FOR CHAMBERS W/ POLYURETHANE INSULATION

1. DIGIT SWITCH SHOWN IN +100.0 POSITION READOUT IN °C ONLY

NOTES: UNLESS OTHERWISE SPECIFIED

DASH QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV
APPLICATION			EFFECTIVITY		

MODEL A1178

ENGINEERING ACTIVITY

DESIGN	
DRAFTED	JANE P
CHECKED	
APPROV	Harris 11-13-73
RELEASE	
DO NOT SCALE DWG	

MATERIAL

FINISH

DELTA DESIGN INC.
A DIVISION OF CONN INC.
6728 CLAIREMONT VILLA RD SAN DIEGO, CA. 92123 - TEL (714) 279-2000

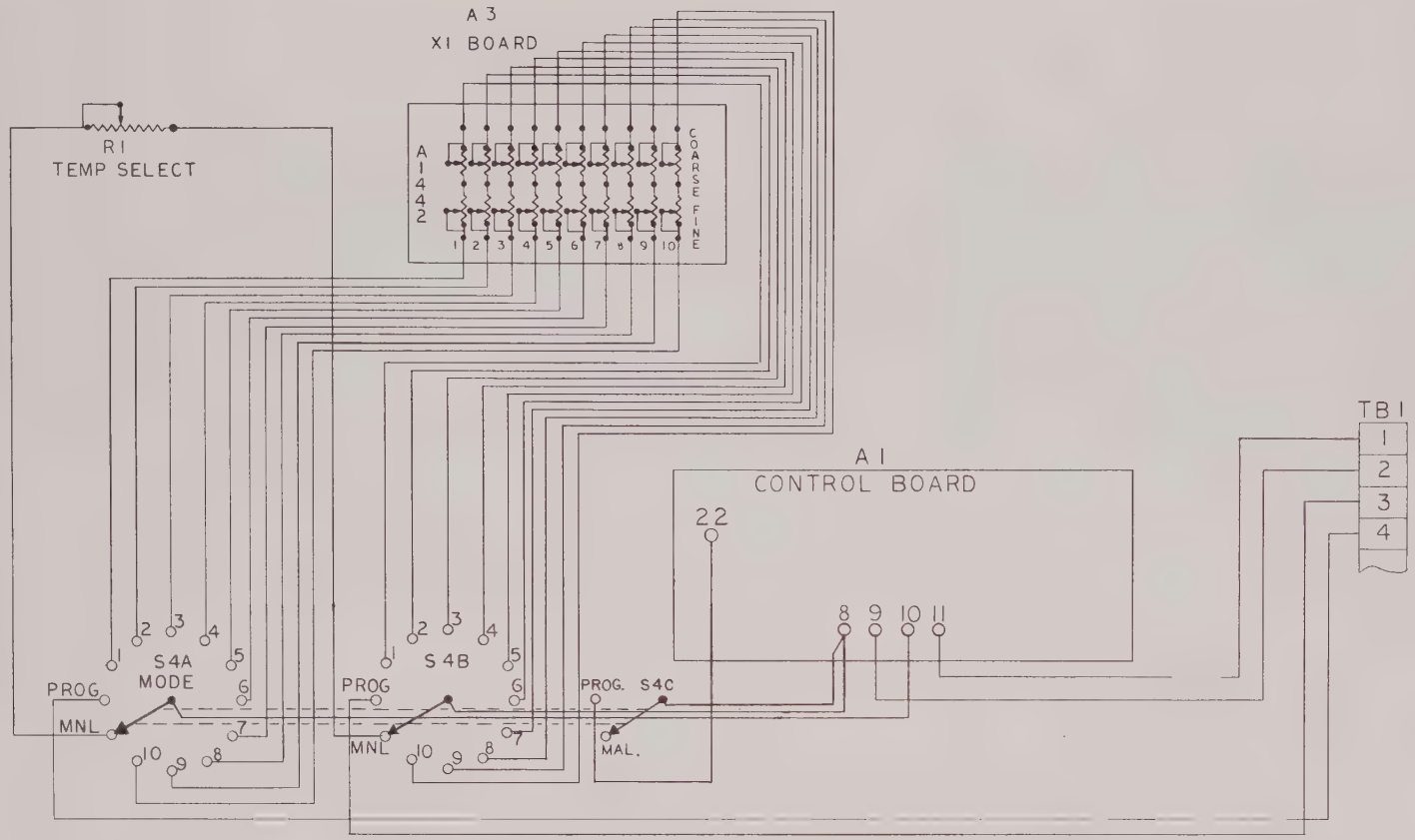
TITLE: WIRING DIAGRAM DIGITEMP CONTROLLER 120/240 VOLT

SIZE D | CODE IDENT | 1639124 | D

SCALE ~ | SHEET ___ OF ___

BLUE CARD

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	A	PER ECN M1020 REV. A 8-7-75 ADDED S4C & A1-22	8-21-5	[illegible]



DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV
APPLICATION				EFFECTIVITY		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES . ON
DECIMALS: .XX ± .03; .XXX ± .010
ANGLES: 0° 30'

HOLE TOLERANCES

.013 THRU .125	+.004 −.001	.251 THRU .500	+.006 −.001
.126 THRU .250	+.005 −.001	.501 THRU .750	+.006 −.001

MATERIAL
FINISH
DO NOT SCALE DWG

ENGINEERING ACTIVITY

DESIGN	DELTA
DRAFTED	R.WILLIAMS 8-13-73
CHECKED	[illegible] 8-13-73
APPROV	[signature] 8-13-73
RELEASE	

DELTA DESIGN INC.
A SUBSIDIARY OF CONU INC.
5723 KEARNY VILLA RD SAN DIEGO, CA. 92123 - TEL (714) 292-5000

TITLE: X1 OPTION ASSY
TYPE III CONTROLLER

SIZE C | CODE IDENT | 2638511

SCALE — | SHEET 1 OF 1

/△/FINISH (IF APPLICABLE)

/△MATL (IF APPLICABLE)

UNLESS OTHERWISE SPECIFIED

[illegible] OF GRAPHICS/ACCUPRESS
ORDER NO 2133

BLUE CARD

DELTA DESIGN, INC.
5725 KEARNY VILLA RD
SAN DIEGO, CA. 92123
TEL. (714) 292-5000

NOTES:

ITEM	QTY	DRAWING NUMBER	DESCRIPTION	MANUFACT AND NO.	STK OR PART NO.	FAB CODE
00	REF		X1 OPTION ASSY			
01	1	△1	PC BOARD A3		1639955	
02	A/R		POTENTIOMETER 10 OHM FINE	BOURNS 3367-P-1-100	0500027	
03	A/R		POTENTIOMETER 500 OHM COURSE	BOURNS 200L-1-200M	0500028	
04	1		SWITCH, MODE S4	CTS T225	1400190	
05	3		STANDOFF, SCREW		4100192	
06	A/R		TERMINAL, SOLDER		1400550	
		△	ART - 1639955 DRILL - 1633534			

REVISIONS

REV	DATE	BY	APPD	DESCRIPTION
A	8-7-75	R Brooks	[illegible]	ITEM 4 WAS CTS215 (ECN #1020)
B	3-8-78	D [illegible]	[illegible]	ITEM 1 WAS 1300009

TITLE: X1 OPTION ASSEMBLY

NEXT ASSY P/L:

BY	ROGER WILLIAMS	8-10-73
CHK	[illegible]	8.13.73
APPD	[illegible]	8-13-73

P/L 2638511 REV B SHT 1 OF 1

SAN DIEGO, CALIFORNIA

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